Volume 93 Number 24

STEEL

For forty-eight Years—IRON TRADE REVIEW

PRODUCTION • PROCESSING • DISTRIBUTION • USE

The Week in Perspective

THOUGH no more than a happy coincidence, Henry Ford, apostle of the short-work week and considered radical by many when he adopted the 5-day week, has introduced his 1934 creations simultaneously with approval (p. 11) of a code for one leading industry which calls for a 27-hour week—three days of nine hours each. Always more concerned with the engine of a car than with the body, the sage of Dearborn can glory in his new model in which (p. 13) body changes have been subdued in favor of refinements in the power plant . . . . But where Ford sidesteps the issue in body design, Walter P. Chrysler's DeSoto strikes out boldly (p. 14) with the most radical conception of streamlining yet evolved . . . . General Motors also goes radical in adopting (p. 14) hydraulic brakes for Oldsmobile.

Mills Look to Transportation Fields

With cars not yet in production, automobile steel requirements as yet have not been released, but are expected soon to offset a normal seasonal shrinkage in steelmaking. Operating rate for the week is steady (p. 11) at about 29 per cent, with a mild slackening in prospect . . . . Railroad requirements, in the form of track and repair material, are maturing (p. 45), 100,000 tons from the Pennsylvania road, recently placed, being the largest steel award from a railroad this year . . . . Scrap prices, long an efficient barometer of industrial weather, have turned upward (p. 59) for the first time since August . . . . Improvement in iron and steel markets continues (p. 61) in Europe and on the Continent, as well as in Africa and the Far East.

Merry Christmas in View for Code Carvers

With the steel code continued through May, 1934, no labor trouble immediately in the offing, and governmental price haggling quiescent, the industry approaches the holiday season with few worries (p. 17), as far as NRA is concerned . . . . Plugging what have been termed "a few blank spaces" in the recovery administration, the President has created (p. 10) a National Emergency council (NEC) to take over on a permanent basis all the work of present volunteer agencies in connection with administration of codes . . . . Disastrous results of Wisconsin's recent program for redistribution of wealth by taxing industry should sound a significant warning (p. 18) to radical experimenters at Washington who would shape federal taxes along too socialistic lines.

Engineers Should Turn Ability to Distribution

In possession of the technique for almost unlimited wealth, the engineer is told (p. 26) he no longer can afford to stand aside while financiers, promoters and politicians so tragically bungle the problem of its distribution . . . . Mechanical engineers are urged (p. 34) to enter more extensively into the investigation of the metallurgy of steel . . . . To determine the effects of temperature and other rolling conditions upon the deformation resistance of steel bars, three series of tests have been performed (p. 28) by German technicians, with varying ratios of final bar thickness to roll diameter . . . . Another German research has demonstrated (p. 39) that the tendency toward embrittlement on cold working a steel is greater as the proportion of pig iron in the open-hearth charge is increased.

Strive for Homogeneity in Welded Joints

Homogeneous welded joints, since they particularly effect the rigidity and fatigue performance of a steel structure (p. 21), are most desirable. Such joints have two characteristics: Material comprising them must have uniform physical properties from point to point; and distribution of stress should be of maximum uniformity. Certain precautions in welding procedure must be observed to attain these ideals . . . . Oxyacetylene flame cutting of practically all thicknesses of rolled steel can be accomplished (p. 37) with reasonable accuracy . . . . A new range of strong, light alloy steels, primarily for use of the railroad industry, is being introduced (p. 34) by a leading steel interest.

Emergency Council Set Up To Speed NRA Code Compliance

FOR the purpose of co-ordinating various agencies of the government recovery program, President Roosevelt, by executive order of Nov. 17 and effective 30 days from that time, has created a National Emergency council, comprising an executive director and the following:

Secretaries of the interior, agriculture, commerce and labor; administrators of NRA, agricultural adjustment, and federal emergency relief; chairman of the Home Owners Loan Corp.; governor of the Farm Credit Administration; and a representative of the Consumers Council.

Frank Walker, treasurer of the Democratic national committee, has been named by the President as temporary executive director of the NEC, at a salary not to exceed $10,000 a year.

Directors will be named in each of the 48 states; they will set up organizations, probably making use of the office staffs of the present 26 district compliance boards of NRA, according to a statement made Wednesday by William H. Davis, national compliance director of NRA.

Work Is Financed

The President's executive order allocated $10,000 from the original NRA appropriation for carrying out preliminary organization work of the NEC. Council members will serve without compensation.

Abolishment of all volunteer field agencies established to carry out any phase of the recovery program also is effected, their work to be taken over by the new council. From this it may be deduced that the administration has been convinced of the permanent value of present temporary agencies, and is seeking to establish on a sound basis a permanent organization to continue with the work.

From the standpoint of code compliance, Mr. Davis points out that the new setup in its entirety "is designed to provide for an easy transition to industrial self-government, at the same time insuring quick elimination of noncompliance."

The new state organizations, supplemented possibly by representatives in the field, will act for industry where it is organizing to handle code compliance problems for itself; where an industry in a certain territory has no agencies of industrial self-government; where an industry, though organized to handle complaints, has no approved machinery to handle labor complaints; or where, if this machinery has been set up, it has failed to adjust complaints.

It is pointed out that the new council will have no code enforcement powers, these being confined as previously to the attorney general and the federal trade commission.

Under each state director will be an adjustment board, comprising a representative of "public interest," a representative of industry and a representative of labor.

A further ramification of the NEC will be the establishment of a central information bureau with branches throughout the country, for the purpose of "conveying to the public all factual information with reference to the various governmental agencies."

Labor

TIN Plate Appreciation Day was recently observed in Elwood, Ind., to show that city's gratitude to the American Sheet & Tin Plate Co. for maintaining operations during the depression and mitigating unemployment. It was in Elwood that the first tin plate plant in the United States was completed, in 1892.

Thirty thousand visitors thronged the city, company executives from Pittsburgh headed a four-mile parade. Ten thousand were served at a free barbecue for employes and their families.

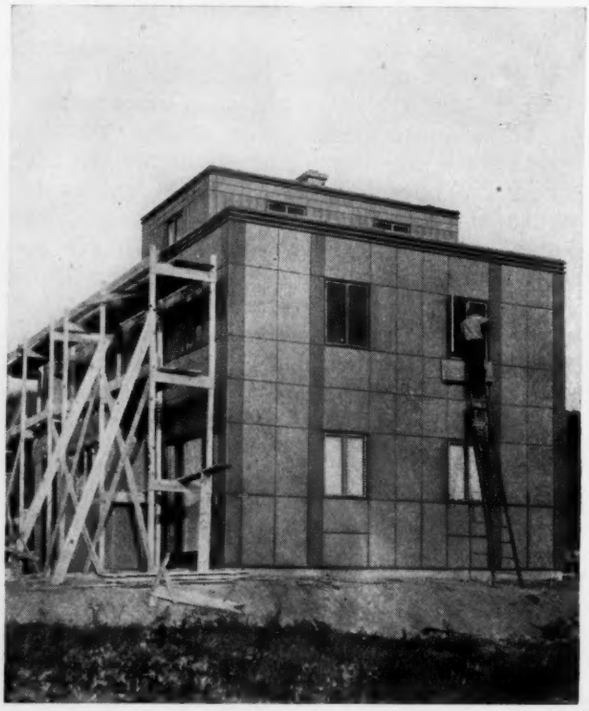
In place of bunting and crepe paper, tin plate was suspended from wires throughout the business district. Business houses also used tin plate generously in decorating.

D. A. Barrett, Pittsburgh, vice president of the company, was accompanied by his assistants—J. C. Whetzel, H. G. McIvried and T. W. Wilson. Speakers in addition to Mr. Barrett included John Byus, manager of the Elwood works; F. G. Henderson, representing employes; King Leeson, representing Elwood business men; and Mayor George M. Bonham.

¶Employes representation elections set two months ago for Dec. 11 at the Weirton Steel Co., Weirton, W. Va., have been postponed following objections of union leaders to certain conditions. The complaint is now before the national labor board.

¶First attempt at collective bargaining with the United Mine Workers at mines of the H. C. Frick Coke Co., subsidiary of the United States Steel Corp., Thursday resulted in a deadlock, with a further meeting scheduled for Friday. An insurgent mine leader meanwhile attempted to call a strike in Fayette county, Pennsylvania, without union authorization, with the result that miners first agreed to strike and then rescinded their action. The result of this was in the balance over the week-end as mines on a three-day week are closed until Monday.

A new election is believed inevit-



BUILT "TO OUTLIVE THE NEXT CENTURY OF PROGRESS." This frameless steel house the Wheeling Corrugating Co. is erecting at Wheeling, W. Va., is attracting attention of engineers and architects. Of simple construction, it has a flooring system with a load-carrying capacity 40 per cent greater than that required for ordinary residences. Other features: Steel walls, all-steel partition studs; steel lath. A fire in one room can be confined to that room

able at the Edenborn mine of the Frick company where a tie vote resulted in the Nov. 17 election. United Mine Workers elected representatives at 20 of 29 captive mines in the November election.

¶Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., was to put 2600 men back to work when it reopened its rail mill at Ensley, Dec. 13.

¶Gary, Ind., tin mills of the American Sheet & Tin Plate Co. now are employing 4300 workmen, an increase of 600 during the past month, and a new high record.

Institute

AMERICAN IRON AND STEEL INSTITUTE directors at their regular monthly meeting Wednesday are expected to be called upon to act on further trade resolutions, as the commercial committee met last Tuesday and Wednesday and the administrative committee met Friday.

Codes

ORGANIZED labor in a revision of the cast iron soil pipe code achieves not only the 30-hour week which it has set up for its objective but has even gone farther and obtained a 27-hour week. As approved, the revised soil pipe code specifies a 9-hour day and a 3-day week.

The proposed limitation of productive machinery provided in the amendment offered by the Cast Iron Soil Pipe association was said by the association "to furnish a definite operating guide for all manufacturers alike, without permitting even the possibility of misunderstanding and to offer absolute equal opportunity for manufacturers and labor throughout the industry."

¶The President approved a code for the malleable iron industry, effective Dec. 7, and for the national tool and equipment distributing industry, effective Dec. 8. A hearing on the code for the machine knife and allied steel industry has been set for Dec. 11 in Washington.

Financial

BELFONT STEEL & WIRE CO., Ironton, O., in receivership, is to be reappraised prior to being offered for sale for the second time. The sale scheduled last March 30 developed no bidders. The company has two blast furnace stacks, with a total annual capacity of 168,000 tons, and finishing capacity for 50,000 tons of plain wire, 10,500 tons of barbed wire, 7500 tons of galvanized wire and 600,000 kegs of wire nails.

Transportation

RIVER transportation interests, up and down the Ohio river, are expected to join the agitation motivating a complaint filed at Washington last week by the Ohio Valley Improvement association, Cincinnati.

The protest centers about steel's code of fair competition, which in regulating freight rates threatens inland waterway transportation of iron and steel products, so river interests aver.

The Cincinnati association's complaint itemizes the discrimination aganst water shipment because the code states freight rates must be based on rail tariffs from basing to delivery points.

Even the Pittsburgh steel mills which operate their own line of water deliveries on steel lose the advantage they once had, says the complaint, since transportation costs to the steel purchaser are based on rail rates regardless of the mode of shipment. The complaint fails to state, though, that this full charge is not lost to the shipper but that it is money made.

Production

STEEL production was little changed last week at 29 per cent, being fractionally over rather than under, and while a few districts indicate a slightly easier condition this week the decline will be slight.

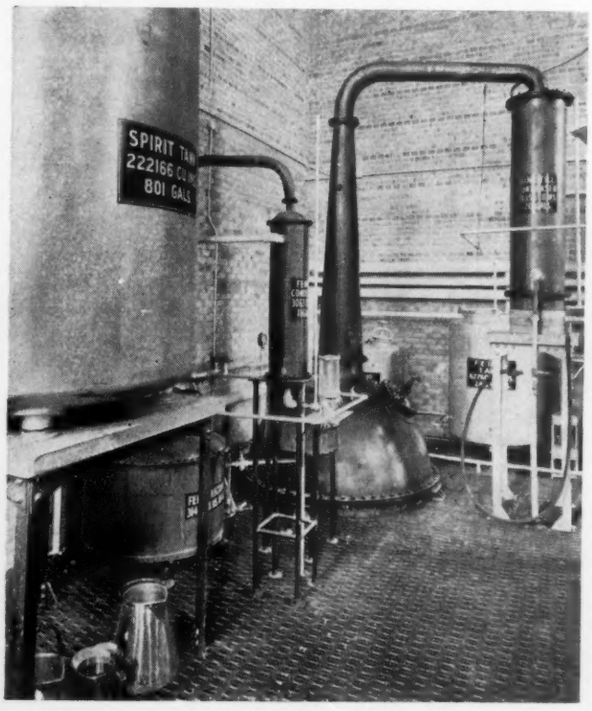
Wholly contrary to the seasonal trend, increases were actually registered last week in the eastern Pennsylvania, Pittsburgh, Birmingham, New England, Cleveland and Lorain districts. Youngstown, Chicago and Buffalo mills eased off sufficiently to about neutralize the foregoing gains.

Pittsburgh mills at 24 per cent were up 2 points, and the next move there probably will be down. Nearby Wheeling mills dropped 10 points to 41 per cent, 15 out of 37 open hearths being on. Cleveland's rate jumped 6 points to 54 when Otis Steel Co. added two units and National Tube, at Lorain, also two.

Eastern Pennsylvania went up 1½ points to 18½ per cent, regaining all the ground lost since the second week of November. Birmingham mills registered the greatest increase of all, going from 20 per cent to 52, as open-hearth capacity was added in anticipation of resumption at the Ensley rail mills. In New England, the gain was 6 points, from 75 per cent to 81, and this rate is expected to hold this week.

Chicago eased from 28 per cent to 25½ and one steelworks blast furnace was banked. Only slight fluctuations are anticipated the remainder of this month. Buffalo mills last week curtailed from 30 per cent to 24 and this week will go to 21 per cent, only 8 open hearths being scheduled. Youngstown mills held at 35.

At Detroit, the Great Lakes division of National Steel continues to have three out of eight on, and Ford four out of ten although one of the Ford units is the large 450-ton furnace, which is duplexing. Ford is operating the 14-inch bar mill and is repairing another open-hearth furnace. A rumor that National Steel would build a 72-inch mill at its



ALL FOR THE "DELICACY" OF GIN: Manufacturers of this liquor seek to capture and preserve its "brilliance" and aroma. Tanks and other equipment made from a new alloy containing more than 80 per cent pure nickel and 12 to 14 per cent aluminum have been installed in the plant of W. A. Gilbey Ltd., New London, Ont.

Michigan Steel division is unconfirmed.

¶In point of open-hearth and bessemer ingot production, November showed a 50 per cent increase over a year ago, according to American Iron and Steel institute statistics. This year November turned in a daily average of 59,265 gross tons, or 27.26 per cent; a year ago the daily rate was 39,701 tons and the percentage of capacity engaged was 18.36 per cent. Total output in November was 1,540,882 tons. In 11 months 21,057,319 tons of steel have been produced, against 13,332,833 tons in all 1932.

¶Shipments of pure charcoal pig iron by the Superior Charcoal Iron Co., Grand Rapids, Mich., in the first 11 months of 1933 were 220 per cent of shipments for all 1932.

Suggests Factory Bathroom As New Use for Steel

Manufacture of bathrooms on a production scale was the suggestion which won for Barton R. Shover, consulting engineer, Pittsburgh, first prize in the contest for new uses of steel, conducted during the past year by the Association of Iron and Steel Electrical Engineers.

Second prize was awarded to M. Appel, draftsman, Ohio works, Carnegie Steel Co., Youngstown, O., for the suggestion for investigation and research to further the use of decorated steel tile for interiors of residences and commercial and public buildings. S. Ein, testing engineer, South Works, Illinois Steel Co., South Chicago, Ill., winner of third prize, suggested that telephone booths containing coin-in-slot telephones be made from steel plates.

First prize was $150; second prize, $50; and third prize, $25. Names of the three winners were announced in the Oct. 30 issue of STEEL, but at that time information as to the suggestions was not available.

Mr. Shover's suggestion was that complete bathrooms be assembled in the factory, shipped to destination and made ready for use simply by connecting three pipes and two electric wires.

The room would consist of a steel frame lined wholly or in part with sheet steel, enameled, lacquered, or painted; floors and walls tiled as desired; complete fittings, including pressed steel bathtub and lavatory. The most serious difficulty to be overcome in introducing this type of bathroom, according to Mr. Shover, would be antagonism of labor unions.

Bacon & Co. to Ryerson

Joseph T. Ryerson & Son Inc., Boston, New York and Chicago, has purchased the stock and good will of Bacon & Co., Boston, which was organized in 1868 by Josiah E. Bacon. A year later the firm of Bacon & Brown was organized and in 1878 Mr. Bacon retired and formed Bacon & Co.

Steel Ingot Production — 1932-33

93.71 Per Cent of Industry Reporting

Gross Tons

1932	Open-hearth	Bessemer	Monthly output companies reporting	Calculated monthly output all companies	No. of working days	Approximate daily output all companies	Per cent operation
Jan.	1,230,907	160,633	1,391,540	1,484,991	26	57,115	26.41
Feb.	1,230,970	157,067	1,388,037	1,481,252	25	59,250	27.40
Mar.	1,149,193	193,944	1,343,137	1,433,337	27	53,087	24.55
Apr.	1,036,163	144,197	1,180,360	1,259,629	26	48,447	22.40
May	950,838	103,593	1,054,431	1,125,243	26	43,279	20.01
June	755,068	100,249	855,317	912,757	26	35,106	16.23
July	653,039	102,916	755,955	806,722	25	32,269	14.92
Aug.	696,122	97,323	793,445	846,730	27	31,360	14.50
Sept.	804,470	124,970	929,440	991,858	26	38,148	17.64
Oct.	885,773	132,876	1,018,649	1,087,058	26	41,810	19.33
Nov.	838,419	128,844	967,263	1,032,221	26	39,701	18.36
11 mos.	10,230,962	1,446,612	11,677,574	12,461,799	286	43,573	20.15
Dec.	724,917	81,932	806,849	861,034	26	33,117	15.31
Total	10,955,879	1,528,544	12,484,423	13,322,833	312	42,701	19.75
1933		**96.57 Per Cent of Industry Reporting**					
Jan.	885,743	109,000	994,743	1,030,075	26	39,618	18.23
Feb.	922,806	126,781	1,049,587	1,086,867	24	45,286	20.83
Mar.	784,168	94,509	878,677	909,886	27	33,699	15.50
Apr.	1,180,893	135,217	1,316,110	1,362,856	25	54,514	25.08
May	1,716,482	218,841	1,938,323	2,001,991	27	74,148	34.11
June	2,211,677	296,765	2,508,422	2,597,517	26	99,904	45.96
July	2,738,083	355,836	3,093,919	3,203,810	25	128,152	58.95
Aug.	2,430,750	370,370	2,801,120	2,900,611	27	107,430	49.42
Sept.	1,990,242	240,473	2,231,715	2,310,982	26	88,884	40.89
Oct.	1,847,733	191,673	2,039,406	2,111,842	26	81,225	37.37
Nov.	1,331,091	156,939	1,488,030	1,540,882	26	59,265	27.26
11 mos.	18,040,648	2,294,404	20,335,052	21,057,319	285	73,885	33.99

Figures exclude crucible and electric ingots. Operating percentages for 1932 are based on 67,473,630 gross tons annual capacity as of Dec. 31, 1931; for 1933, on 67,286,130 gross tons annual capacity as of Dec. 31, 1932.

Pig Iron Output Loss in November Is Increased

Final returns from blast furnaces in the United States reveal actual production of coke pig iron in November to be somewhat lower than the compilation published in STEEL last week. The preliminary figures had involved estimation by producers of output for the last two or three days of the month.

The actual average daily rate for November was 36,124 gross tons, which, compared with the 43,824-ton rate of October, was a drop of 7700 tons per day, or 17.5 per cent. The decline in October was 12.8 per cent. Total production was 1,083,740 tons, a loss of 274,800 tons, or 20.2 per cent, from the 1,358,540 tons of October. Merchant iron amounted to 228,557 tons, and nonmerchant and steelworks iron to 855,183 gross tons.

For the 11 months ended in November, output has aggregated 12,029,571 gross tons, against 7,501,135 tons in the corresponding period of 1932.

Blast furnaces operating on Nov. 30 totaled 77, as previously reported. This compares with 81 on Oct. 31.

Relating production to capacity, operations in October were at the rate of 26.2 per cent, against 31.8 per cent in October.

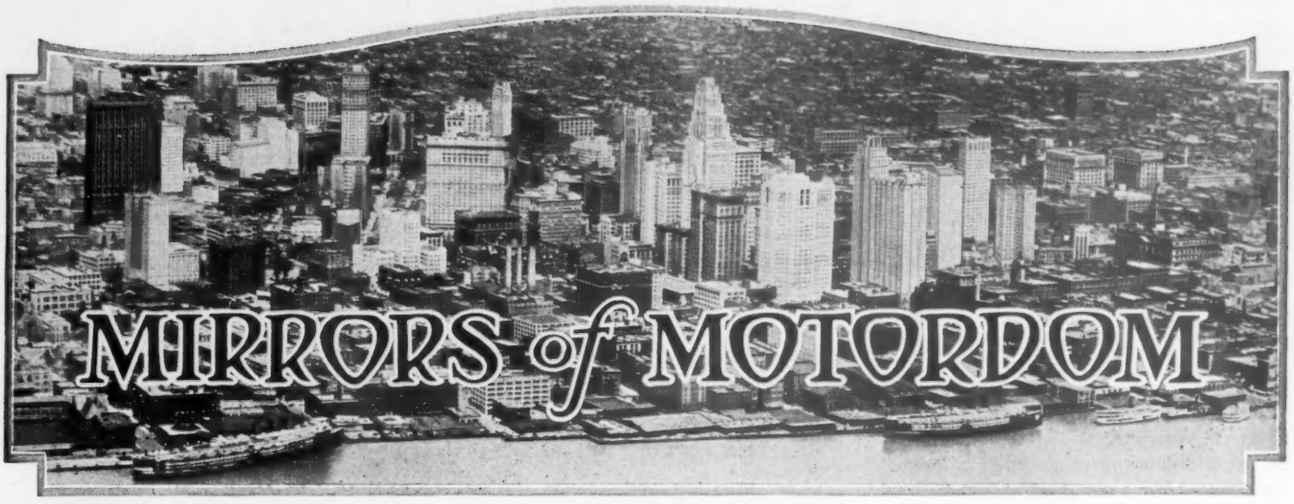
L. E. Ives Opens Own Office in Cleveland

L. E. Ives, for the last 13 years sales manager and shipping agent at Cleveland for Clement K. Quinn & Co., miners and shippers of Lake Superior iron ores, has recently opened his own ore and lake transportation office at 1311 Guarantee Title building, Cleveland.

Mr. Ives will act as sales and shipping representative for the North Range Mining Co., Negaunee, Mich., which recently took over the Blueberry mine on the Marquette range, Michigan, from the Ford Motor Co., and is now operating that property.

He also represents the Tennessee Copper Co., Copperhill, Tenn., in the sale of its "Copperhill sinter." In addition, he will also handle the sale and shipment of iron ore stockpiles at the Archibald mine on the Marquette range.

Besides the above ores for blast furnaces, Mr. Ives also is offering Missouri blast furnace ores and lump iron ores for open-hearth steel furnaces, as well as a number of accessories for steel plants, including Arkansas manganese ore, lumber for car blocking, railroad and mine ties, chemicals for boiler treatment, protective paints for steel, etc.



Ford To Talk Performance

♦ ♦ ♦

Hydraulic Brakes on Olds

♦ ♦ ♦

Labor Still Is Disquieting

DETROIT

WITH so few body changes that the casual observer will have difficulty distinguishing the new models from the 1933 series, the mechanically-minded Henry Ford makes performance his issue for 1934.

Actually, there is a return to a bright radiator shell (chromium-plated, not rustless steel); the scoop effect at the bottom of the shell is eliminated; the hood is slightly flatter; baked enamel, partly the product of Ford-grown soy beans, is used for all exterior finishes; fender colors match the bodies; there is a window ventilation system—as forecast in STEEL for Oct. 30, front door and rear side windows move backward after being closed.

Within, front seats of 2-door jobs are of the individual, bucket type, and in deluxe models there is an arm rest on the door for front seat passengers; upholstery is of a new tufted design; interior sun visors on deluxe models protect from the side as well as the front; the instrument panel is revised slightly. However, at a hasty glance the general interior and exterior appearance is not strikingly different.

Mechanically, the most radical revision is a dual downdraft carburetor and a dual intake manifold. The carburetor is double-barrelled, one half serving the front four cylinders and the other half the rear four, in effect making the V-8 engine a twin four. Engine bore and stroke, like the wheelbase, are unchanged. A 12 per cent increase in power, plus improved acceleration, is claimed for the new carburetor.

Fifty per cent of the new models are now equipped with the new cast alloy crankshafts and as rapidly as possible the steel forging type will be completely superseded. These new crankshafts weigh 56 pounds, 10 pounds lighter than steel, are a copper-chrome-silicon alloy cast from a melt that is 75 per cent new iron and 25 per cent gates and sprue. It is claimed that they not only afford a better bearing surface but also have twice the fatigue life.

Exhaust valves now have high chrome, high tungsten seat inserts; water line thermostats prevent warm water in the block circulating until a pre-determined temperature has been attained; ends of spring leaves are tipped slightly to prevent squeaks and provide easier action; the steering ratio is now 15 to 1.

AS THE automobile industry knows the phrase, the 1933 Ford never was merchandised. Whatever announcement was made was financed by dealers themselves; the series of "personal" letters from Mr. Ford was largely institutional in character.

Thus, in a sense, Ford advertising has something new to promote despite the generally unchanged lines. Mr. Ford, anyway, would rather discuss engines than bodies, hence engine performance, speed and pickup will be the notes struck. At the outset at least, Waring's Pennsylvanians will be on the air for Ford, and extensive use will be made of newspapers and magazines.

Strategically, Ford is in a better position than his competitors. Because body and fender lines were continued, Ford not only saved several million dollars but also was immune to the tool and die makers' strike. Employment at Fordson has been expanded several thousand, to above 30,000 men, and production now approximates 1000 units daily, 5 days a week, and is growing.

While Ford dealers shortly will have new models to deliver, Chevrolet dealers' floors are clear and it will be January before they have their new series to offer. Plymouth dealers still have cars, but it will also be January before their new models are available and in the meantime they must stand the combined pressure of Ford, pushing a new line, and General Motors, urging buyers to hold off.

Incidentally, General Motors' advertising of knee-action springs riles Mr. Ford mightily. Last week, pointing to his transverse springs attached to axles at the outer, flexible tips of the springs, he snorted: "Knee action springs—we've had them 20 years."

By raising prices on passenger cars only $5 to $35, or not to exceed 6 per cent, Ford many exercise a moderating influence on his competition. It is noteworthy, however, that the greatest increases apply to the volume production lines, the 2-door sedan being raised $35 and the 4-door sedan and standard coupe $25. Commercial cars are lowered $25.

Since reopening his steel mill Ford is again buying "junkers," or old automobiles for scrapping, but is only paying $12.50 because so many now come through without tires, glass or battery. This is half the price originally paid.

Detroit still is convinced that the depression will not really be over until Mr. Ford has brought out his small, low-price V-8, the engine of which could almost be packed in a 26-inch gladstone, but the fact that he is starting to merchandise his new series is an indication he believes the trend is right.

PACKARD, Studebaker, Nash and now Ford have shown their hand for 1934, and enough has leaked out concerning the programs of General Motors, Hudson-Terraplane, Graham, Hupp and other makers to support the contention that Chrysler will lead the field in streamlining.

Detroit still is confused whether

the extremely radical design of which it has had occasional glimpse is the new Chrysler 6 and 8 or DeSoto, but both series will blaze new trails. The Airflow DeSoto, it is reported, has a split radiator, with grilles on each side of the front instead of one in the center.

This enables the engine to be mounted farther forward in the chassis, and the rear seat to be relocated at a point just ahead instead of directly over the rear axle. The entire hood and front appear to be one piece, the hood also serving as fenders. Running boards are replaced by steps; the front seat is broad enough for three; a ventilation system with a single, controlled inlet is claimed to equalize the temperature throughout.

So radical is this design, that it appears to be make or break for DeSoto. Detroit is convinced that the chance of success is good, and is backing this judgment up with considerable speculation in Chrysler common, which has again crossed 50 and is touted for at least 75, if not 90.

Plymouth and Dodge six, less radically revised, are getting into production and will have dealers well stocked by early January. Dodge reopened last Thursday. Chrysler and DeSoto, however, will go into the New York show with models laboriously made by hand, as will some other lines, including General Motors.

HUDSON-TERRAPLANE dealers last Thursday concluded a 3-day session at the factory, viewing the Terraplane six and Hudson eights for which a goal of 200,000 cars—four times the volume of 1933—has been set for next year.

Bodies are reported larger, are equipped with a ventilating system, and are moderately stream-lined. Front wheels are independently hung, yet retain a large portion of the I-beam axle, which is the axle-flex system of which much will be heard. The new line will not be disclosed prior to the New York show.

It was reported recently that hydraulic brakes would be offered as optional equipment on all General Motors lines for 1934. The final decision is hydraulic brakes on Olds, vacuum boosters on mechanical brakes on Cadillac and Buick, and straight mechanical brakes on Pontiac and Chevrolet.

Up to this year, General Motors has been the citadel of mechanical brakes, and Chrysler of the hydraulic type. One reason for the departure on Olds is the fact that the redesigned 6 will be priced between Pontiac and Chevrolet and pitted against Dodge.

Starting its second 25 years, General Motors is more radical than any year in its history. Adopting such an advance as knee-action springs for all lines at one time, shifting LaSalle from a V-8 to a straight 8 and lowering its price, going to hydraulic brakes for even one line, and recasting Olds constitutes a big year for GMC.

General Motors advertising, incidentally, now lists Olds just above Chevrolet, indicating its future rating.

Speaking of knee-action springs, some manufacturers of semi-elliptical springs feel aggrieved. Had the industry been willing to spend as much for improved leaf springs as for the new coil springs substantially the same result could have been achieved, they maintain.

Dec. 20 is now the date set for the introduction of Buick, first General Motors car to be shown. Except for a more pronounced rake of the radiator, the outward appearance is not greatly changed.

Chevrolet last week made its first front spring assemblies, and will shortly start final assembling. Next to its new springs, Chevrolet will feature improved acceleration, and some important changes in power plant are to be disclosed.

NOW 76 years old, Charles D. Hastings returns to Hupp as president and general manager for the third time, succeeding Dubois Young. With Mr. Young also goes his dream of a second General Motors, which was the motive prompting the purchase of the Chandler-Cleveland plants in Cleveland.

Three factory officials, three distributors and three financial men of New York now constitute the Hupp board, believed to be the first time that these three factors have had equal representation on an automobile board.

The morale of Hupp was injured when the outgoing administration eliminated bonuses several years ago. This administration also resisted proposals of eastern interests that the line be broadened. Not immediately, but perhaps within a year, it is believed that more ambitious plans for Hupp will be announced.

For the coming year the Hupp line will consist of a six and a medium price 8. Bodies will be manufactured by Murray in Detroit, and the Cleveland body plant closed for the time being. The Hupp 6 engine for 1934 will be about 20 pounds heavier, and somewhat stronger.

Contrary to recent published reports, Continental will manufacture automobiles as well as engines for 1934. At least, it is revising bodies, fenders and radiator shell of the present 6 and 4.

Reo is not intending to revise its present line until it has moved its present stock, which in effect is a new series by reason of the addition in midyear of the automatic gearshift. Perhaps by spring there will be new models.

Nash still has a small car to introduce, expected to carry a new name. Graham is redesigning its 6-cylinder motor, making it slightly lighter.

MEN in Detroit who would not be accounted Jeremiahs continue concerned over the labor situation. It is relaying opinion and not making a forecast to state that a strike tying up production soon after automobile manufacturers swing into volume production in January is possible.

The tool and die makers' strike was timed perfectly, delaying the new models several weeks at least. Organized labor is not active on the surface, although calling meetings at Pontiac and Flint, but is quietly trying to organize production employes.

Wage rates and hours probably will be considered when renewal of the automobile code under NRA, expiring Dec. 31, comes up. Automobile executives are hoping that the temper of the country in another month will be more solidly against strikes than it is today.

A good many in Detroit discount the possibility of labor trouble, arguing that manufacturers have the situation well in hand through "inside" unions, but the contingency remains.

Washing machine and electric refrigerator manufacturers have been bitten by the seasonal model change bug. McCord Radiator contemplates bringing out a washer with a circular tub; its present tub is octagonal. Norge is considering supplementing its conventional circular tub with a new line. Both Kelvinator and Norge recently have introduced new refrigerators. All are large users of steel.

Announces Bridge Contest

American Institute of Steel Construction, 200 Madison avenue, New York, is announcing its sixth annual bridge design competition, this being open to bona fide registered students of structural engineering and architecture in recognized technical schools in the United States and its possessions. First prize is $100, second prize $50, while third, fourth and fifth prizes are certificates of award.

Competitors are to submit by March 3 a preliminary rendition of this problem: Main span of supposed bridge is 500 feet, center to center of towers; cable sag at midspan 60 feet; side spans each 240 feet from center of towers to anchorage connections; clear roadway width is 30 feet; elevation of underside of roadway at towers is 50 feet above water level, and top masonry piers 10 feet above water level.

Industrial Men in the Day's News

Paul Doty, New President, American Society of Mechanical Engineers

For 45 years he has been active with many of the leading gas utility companies.

In army service during the war, he ultimately became officer in charge of utilities in Washington.

Now living in St. Paul, he has heen prominent in A. S. M. E. affairs for two decades.

PAUL DOTY, newly elected president of the American Society of Mechanical Engineers, brings to this honorary position a wealth of experience in engineering activity, notably in the field of gas utilities.

Born in Hoboken, N. J., May 30, 1869, he attended Stevens Institute of Technology there, graduating in 1888 with a degree in mechanical engineering. He soon became affiliated with the Consolidated Gas Co. of New Jersey, Long Branch, N. J., serving as vice president and general manager from 1895 to 1898, when he became secretary and general manager of the Grand Rapids Gas Light Co., Grand Rapids, Mich.

Subsequently he was associated with other utility interests, including Detroit City Gas Co., Detroit; Union Heat, Light & Power Co., Fargo, N. Dak.; St. Paul Gas Light Co., St. Paul; Edison Electric Light & Power Co.; and the St. Croix Power Co.

In 1917 he became a major in the engineering corps of the United States army and in his two years' service was utilities officer at Camp Grant, Ill., and later officer in charge of utilities with headquarters in Washington. In 1919 he was named detailed member of the general staff corps to advise and recommend to the secretary of war on construction projects for the army.

Mr. Doty is registered engineer No. 1 in Minnesota, his present home being in St. Paul. He is chairman of the Minnesota state board of registration for architects, engineers and land surveyors.

A member of the mechanical engineers' society since 1904, he has been identified in executive capacity with many of the organization's activities. He has contributed to the technical press on a variety of subjects relating to the gas industry, and is the inventor of many improvements in gas machinery.

He is a member of the American Institute of Electrical Engineers, American Gas institute, National Electric Light association, Illuminating Engineering society and the Society of Military Engineers.

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C. F. and R. W. Kolkmeyer, who have been associated with the Domhoff & Joyce Co., Cincinnati, are now affiliated with the Chicago office of Luria Bros & Co. Inc., scrap dealer, with headquarters at Reading, Pa., and branch offices in New York, Boston, Philadelphia, Pittsburgh, Detroit, and Lebanon, Pa., as well as Chicago. W. E. Richey continues district manager at Chicago, with offices in the Straus building.

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Thomas Heberton Doan Jr. has been elected president of the Foote-Burt Co., Cleveland, drilling machine manufacturer, to fill the vacancy created by the death of George E. Randles, noted in the Oct. 23 issue of STEEL. Mr. Doan has been with the company 27 years, coming from Philadelphia. He served as sales representative in the Detroit territory for several years, has been vice president since 1919 and in charge of sales and manufacturing for the last nine years.

R. E. Delamater succeeds Mr. Doan as first vice president. W. F. Babcock has been appointed second vice president, a newly created position.

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A. C. Lehman, president, Blaw-Knox Co., Blawnox, Pa., recently returned to Pittsburgh from a two-month's tour of Europe.

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C. L. Anger, widely-known plating engineer, is now associated with the recently opened Cleveland office, 708 Keith building, of Udylite Process Co., Detroit. In past years, subsequent to his graduation from the University of Michigan, Ann Arbor, Mich., he has been affiliated with the C. G. Spring & Bumper Co., C. M. Hall Lamp Co., General Chromium Corp. and Detroit Plating Industries, all of Detroit; and the Chicago and Detroit offices of Hanson-Van Winkle-Munning Co. For the past few months, Mr. Anger has been

C. L. Anger

working on special plating problems in the Udylite laboratories.

J. S. Hoffman will be in charge of the Cleveland branch of the company. L. J. George and Mr. Anger will be his assistants.

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Eugene W. Pargny, president, American Sheet & Tin Plate Co., Pittsburgh, since 1909, who has been on leave of absence since Jan. 1, has requested that he be relieved of his duties Jan. 1, 1934, retiring under

the pension plan of the United States Steel Corp. Charles W. Bennett, vice president, who for the past year has served as acting president, will succeed him.

Born in Louisville, Ky., Mr. Pargny was first associated with the steel industry in 1882, being purchasing and sales agent for the Apollo Iron & Steel Co. Upon consolidation with the American Sheet Steel Co., he became district manager in charge of the Kiskiminetas valley mills, which included the Vandergrift works, then the largest sheet plant in the world. Following formation of the American Sheet & Tin Plate Co., he was made second vice president in charge of commercial department. He later became first vice president in charge of sales and on Jan. 1, 1909, succeeded C. W. Bray as president.

Mr. Bennett, whose career was sketched in the March 6 issue of STEEL, has been active in the steel industry for 41 years. A graduate of the University of Wisconsin, Madison, Wis., he first was employed in the mechanical department of the Illinois Steel Co., Joliet, Ill., later becoming mechanical engineer of the Elwood, Ind., plant of the American Tin Plate Co. When the latter was consolidated into the American Sheet & Tin Plate Co., he was named distric manager of the Indiana plants of the company. In 1926 he was named assistant to the president, a position he held until 1925, when he succeeded the late Stewart A. Davis as vice president in charge of operations.

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A. L. Humphrey, executive director and former president of Westinghouse Air Brake Co., Wilmerding, Pa., has been elected chairman of the board of the company, filling the post left vacant by the recent death of H. H. Westinghouse. Mr. Humphrey's election culminates 30 years' service with the company.

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J. P. Doan, president, American Tool Works Co., Cincinnati, has been elected a director of the American Rolling Mill Co., Middletown, O., succeeding the late James P. Orr.

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John B. Campbell has been appointed by the receiver of the Pettibone-Mulliken Co., Chicago, as general manager, succeeding C. H. Eib who severed his connections with the company as of Nov. 30.

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Frederick C. Crawford, vice president and general manager, Thompson Products Inc., Cleveland, has been named president to fill the office vacated by the death of Charles E. Thompson, noted in STEEL for Oct. 9.

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Wilbert Wear has been elected president of the Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa., succeeding the late C. B. Houck. He has been treasurer since Nov. 1, 1929, and will continue in that capacity.

N. W. Cassel has been chosen vice president and will continue to serve as secretary.

Henderson B. Liggett, formerly general superintendent, has been appointed general manager.

Charles Garside, associated with Choate, Larocque & Mitchell, New York, has been elected director to succeed Mr. Houck.

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F. Edward O'Neil has been elected president, Fulton Iron Works Co., St. Louis. Associated with the company since 1905, he started as apprentice in the machine shop, was vice president in charge of the New York office from 1917 to 1928, when he returned to St. Louis.

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Arthur G. White has been elected vice president in charge of production of the Follansbee Bros. Co., Pittsburgh. Previously he was with the American Sheet & Tin Plate Co. for many years.

R. C. Kirk, vice president and treasurer of the Follansbee company, resigned recently.

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Cleve W. Ritz has been appointed Ohio district sales manager of Columbia Steel & Shafting Co., Pittsburgh, with headquarters at 1210 East Fifty-fifth street. Cleveland.

Died:

ALEXANDER LEGGE, 67, president, International Harvester Co., Chicago, and first chairman of the federal farm board, at his home in Hinsdale, Ill., Dec. 3. Starting with the company in 1891 as a collector, he became assistant general sales manager in 1906, general manager and vice president in 1913, and president in 1922. During the war he was vice chairman of the war industries board, in charge of all munitions shipments abroad. Recently he had been engaged in drawing up a code for the agricultural implement industry.

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Charles B. Houck, 65, president of the Harrisburg Pipe & Pipe Bending Co., at Harrisburg, Pa., as noted in the Nov. 27 issue of STEEL. He had been president of the company since Jan. 1, 1930, succeeding Christian W. Lynch. For a number of years prior he was vice president and general manager of the Lehigh Traction Co. and the Wilkes-Barre & Hazelton railway. His home was in Hazelton, Pa., and he was a graduate of Dickinson college, Carlisle, Pa.

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Albert F. Knight, 36, Chicago representative, Cincinnati Milling Machine Co., Cincinnati, in an automobile accident near Cincinnati, Dec. 3.

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Charles C. Kritzer, 72, president and founder of the Peerless Ice Machine Co. and the Kritzer Co., Chicago, Dec. 5.

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Arthur H. Springer, 74, president, Springer-Whitaker Foundry Co., Terre Haute, Ind., at his southern home in Winter Haven, Fla., recently.

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Thomas H. Wiles, 62, foundry superintendent, National Malleable & Steel Castings Co., Indianapolis, at a hospital in that city recently. He had been with the company since 1891.

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John J. Mahoney, 77, president, Cahill Iron Works, Chattanooga, Tenn., in that city, Nov. 27. He was one of the organizers of the Lookout Boiler Co. and the Southex Machine Co., of Chattanooga.

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F. J. Webb, 56, manager of the Lake Superior district iron ore mining properties of the Republic Steel Corp., Youngstown, O., Dec. 4, while motoring from Virginia, Minn., to Duluth. His headquarters were in Duluth.

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O. N. Harbin, 68, for the past 25 years associated with the York Ice Machinery Co., York, Pa., and for the past several years general superintendent of the company's plant in Atlanta, Ga., at his home in Atlanta.

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George S. Sevey, 75, for many years engaged in the sale of railway supplies in the Middle West, in Chicago, Nov. 30. He had spent the greater part of his business life with the Otis Steel Co., Cleveland, until recently having been in charge of railroad sales for that company.

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Calvert Townley, 69, former vice president of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., recently at New York. Beginning work in the Westinghouse offices at East Pittsburgh as a clerk, he later rose to become assistant to the president, then vice president. He had been retired and living in New York since 1931.

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Richard B. Mellon, 75, long prominent in industrial and financial activities in the Pittsburgh district, at his home in Pittsburgh, Dec. 1. Active head of the Mellon interests, with his brother Andrew he was cofounder of the Mellon Institute of Industrial Research, often referred to as the "West Point of America's industrial system." For many years he had been an executive officer of a long list of industrial companies, including Crucible Steel Co. of America, Koppers Construction Co., Pittsburgh Coal Co., Aluminum Co. of America, and many others.

WINDOWS OF WASHINGTON

Roosevelt Is Holding Public

• • •

Bystander Role for Steel

• • •

Skilled Labor Danger Point

WASHINGTON

WALK down the charging side of a battery of open-hearth furnaces during the refining period, and except for a few stray rays of light escaping around the closed peepholes there is no indication of the seething, boiling bath of steel within.

Washington is like that right now, and steel is in the fortunate position of not having even to peer through the peephole. Outwardly, a mantle of calm actually appears to have settled down upon the administration.

Serene in the face of all attacks, including the heavy artillery of Al Smith and Professor Sprague, the President is proceeding with his monetary experiment. Astute politician that he is, he has had his ear to the ground and detected no rumblings of serious discontent.

There still is every indication that, in view of the disclosures concerning financial events leading up to 1929, nothing that the financial community can say concerning gold and inflation leaves a lasting impression.

In fact, the senate investigation of the banking situation at Detroit, scheduled to start shortly, will add more fuel to the flames and perhaps rally public sentiment to the administration just as the new congress is taking hold.

One by one the scouts who have been testing sentiment in various parts of the country report no basic fear of inflation, there being no rush from dollars to real estate or commodities. The fact is, a little of this would have helped raise commodity prices and supported the Warren theory a little more vigorously.

The recent congressional bye election in West Virginia was an unquestioned victory for the administration. Editorial criticism has been more free recently, and the Republican national committee has raised its head again, but the President's popularity with the great mass of people is little diminished. There are some defections, of course, but they are fewer than might be expected.

SO, as congress is about to convene, the authority of the White House appears to be unchallenged, and there are no open evidences of any revolt or any disposition to take back power. Technically, many of the drastic powers of the President expire with the return of congress.

This is not to say that the President is unaware of the discontent within the administration, evidenced first by the reconstruction of the state department, then the treasury and now, in process, the department of agriculture.

He feels the hot flames licking his feet, but to him the unrest among the younger intelligentsia of his regime is a healthy sign. Out of the give and take and the unceasing debate over economic policies he expects new and sounder economic truths to emerge. He prefers the laboratory method to theories.

Its code extended to May 31 amid a striking showing of co-operation to NRA, no labor trouble immediately in the offing, Railroad Co-ordinator Eastman calmed down over the price of steel, increased requirements for material coming out through the various government programs, and the government complacent toward the slow but steady rise in prices—steel appears to be practically worryless, the times considered.

STEEL, however, cannot afford to be lulled into a false sense of security concerning the labor situation.

At the moment, a few small pinpricks at "captive" coal mines in western Pennsylvania appear to be the only disturbers. Extension of the steel code was achieved without any revision of hours or wages.

Donald Richberg, chief counsel for NRA, has become an unexpected ally of industry for the time being by quelling labor's demands that minima for semiskilled and skilled labor be included in the construction code.

Not for nothing has the American Federation of Labor been swelling its ranks, and its organization efforts have been concentrated on skilled rather than unskilled labor. Steel and other industries have more to fear from skilled, inside labor than from the yard classification.

The Federation is aware that the time is not ripe for the presentation of any demands, but if early spring should develop the expected rise in production and the upward trend of commodity prices continues, labor may be expected to demand more.

General Johnson may feel safe that the Federation will not attack NRA, but this is no guaranty against pressure for a federal-enforced 30-hour work week. Organized labor will be stronger than ever in confronting congress, while industry will still be broken into a number of pieces.

Indications are that the PRA or blanket code, which expires Dec. 31, will be extended as a voluntary matter. It is reasonable to expect the President to ask retail business and those industries not yet operating under a code to go along on the same basis.

For the moment, NRA appears to have eased into a groove, if General Johnson could be said to stand hitched. Industry is disposed to cooperate more freely, taking its cue from labor and attempting to get as much out of the recovery act so long as it is the law of the land. It is the agricultural administration that is seething, the chief complaint being that George Peek and his group are not radical enough.

EDITORIAL

In Redistributing Wealth, Avoid Wisconsin Error!

MANY months ago, in discussing the disastrous effects of exorbitant taxes, we referred to the exodus of industries from Wisconsin caused by a distribution of taxes which placed an unfair burden on manufacturing concerns. According to the *Chicago Tribune*, industries now are returning to that state, having been assured by the present governor that "industry will not be crucified by partisan politics nor capital made a helpless victim of discriminatory taxes."

It will be remembered that the underlying cause of the persecution of capital and industry in the Badger state was the effort to redistribute wealth through the medium of taxes. The legislature enacted a law which made compulsory a state property tax levy whenever the balance in the state treasury dropped below $2,000,000. The state indulged in social experiments which were expensive, expecting industry to foot much of the bill. Numerous restrictions were imposed upon industry, many of which were unnecessary and burdensome.

As a result of these tactics, many companies with plants in Wisconsin shifted part or all of their operations to branches in other states. The number of applications for incorporation decreased. Had the doctrine of "redistribution of wealth," as envisioned by the younger La Follette, been pursued much further, the state would have suffered severely.

Unrestrained Social Experiment, Pursued To Detriment of Industry, Proves Disastrous

Fortunately the present governor has a better appreciation of the economic and social importance of industry than his predecessor. He was instrumental in repealing the obnoxious property tax levy. He has reduced the cost of government and has demonstrated a desire to treat capital and industry fairly. The reaction to this policy is not surprising. Applications for certificates of incorporation are more numerous. General Motors has been encouraged to reinstate its Janesville plants. Other corporations are preparing to increase activities in their Wisconsin branches.

The experience of Wisconsin is worthy of special attention at this time, because the entire nation is involved in a program which contemplates a redistribution of wealth and sweeping social reforms. Pertinent also is the fact that the professor who served as chairman of La Follette's state tax commission was for a short time in the employ of the treasury department of the federal government. It is to be hoped that his dismissal may be construed as evidence that the Roosevelt administration does not countenance the policies which the former tax commissioner pursued in Wisconsin.

President Roosevelt's philosophy of economic and social reform, embracing "a more abundant life" for every man, woman and child, appeals strongly to the nation. His best exposition of this philosophy was heard in his radio address last Wednesday evening when he said, *"We recognize the right of the individual to seek and to obtain his own fair wage, his own fair profit, in his own fair way—just so long as in the doing of it he shall not push down nor hold down his own neighbor."*

Approving Philosophy, Industry Fears Zeal For Reform May Exceed Bounds of Reason

Every fair-minded man in finance, business and industry should subscribe whole-heartedly to this as a guiding principle in the program of readjustment to which the nation now is committed. No one can object to a redistribution of wealth which conforms strictly to this philosophy. The President will not encounter serious protest against any measures he may take which will prevent the exploitation of the public by dishonest men in high positions.

The only possible conflict will be in regard to the methods employed to attain this high goal. Industry knows from painful experience that the zeal of a nation which is imbued with the spirit of reform often carries it to fanatical extremes. The presence in Washington of a goodly number of officials and advisers who are openly hostile to industry is disturbing to the responsible management of industry. Executives wonder if the redistribution of wealth can be effected without harming thousands of businesses which are innocent of the evils which fanned the flames of reform. They wonder if the government, encouraged by a tremendous wave of public emotion against the fallen idols of finance, will be able to restrain legislative recriminations against the blameless rank and file of finance and industry.

To spoil this great opportunity for economic and social advancement by crucifying industry would be a calamity. The La Follette fiasco showed the results of unrestrained zeal in social experiment. The mistake made at Madison should not be repeated at Washington.

THE BUSINESS TREND

Business Finds Support for More Cheerful Outlook

THUS far in December, the trend of business has held true to the pattern defined earlier in the year, namely that it runs counter to the usual seasonal course.

With barely more than two weeks of the calendar year remaining, business normally would be tapering off in anticipation of the holidays. Instead, it is manifesting strong resistance. Throughout the last half of November and the first third of December, industrial activity has fluctuated within very narrow limits. In some lines a faint upward tendency is discernible.

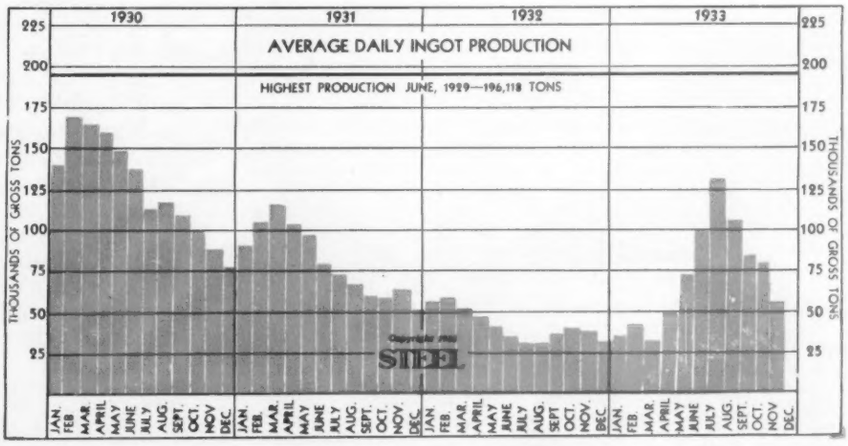
Steelworks operations have been creeping up slowly from the low point of 24 per cent recorded in the week ending Nov. 11. The monthly figures of the American Iron and Steel institute, showing a calculated output of 1,540,822 tons for November, bring the total for 11 months to 21,057,319 tons, against 12,461,799 for 11 months of 1932. Estimating December output roughly at 1,700,000 tons, the total for 1933 will be around 22,750,000 tons, as compared with 13,322,833 tons for 12 months of 1932. This represents a gain of about 70 per cent, which, considered from any angle, is gratifying.

In interpreting the significance of freight car loadings, *Railway Age* states that allowing for seasonable variations loadings were relatively larger in November than in October, "this perhaps indicating the beginning of a new upward trend in general business." The unseasonal gain in November followed a steady decline in August, September and October, which again is contrary to the normal seasonal trend.

Predictions for 1934 Indicate Industrial Leaders Look for Sharp Improvement

No one can ignore the more optimistic tone which prevails in many quarters. One of the economic research bureaus recently bulletined its clients to the effect that an international bull market is in the making. The majority of American forecasters envision a period of business improvement. Industrialists, who venture opinions on the extent of business in 1934, are predicting gains of from 20 to 50 per cent over 1933 totals.

The chief flaw in the present situation is the lack of proper incentive for the investment of private capital. Remove that obstacle and the foregoing predictions for 1934 will prove to be ultra-conservative.



1933

	Tons
Nov.	59,265
Oct.	81,225
Sept.	88,884
Aug.	107,430

1932

	Tons
Nov.	39,701
Oct.	41,810
Sept.	38,148
Aug.	31,360

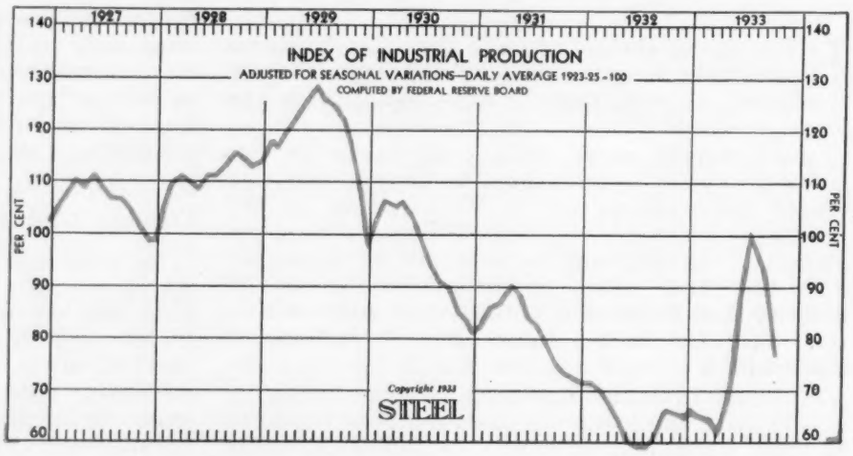
Exports		Imports	
October, 1933	$194,000,000	October, 1933	$151,000,000
September, 1933	160,000,000	September, 1933	147,000,000
October, 1932	153,090,000	October, 1932	105,499,000

Favorable Trade Balance Increases as Exports Rise

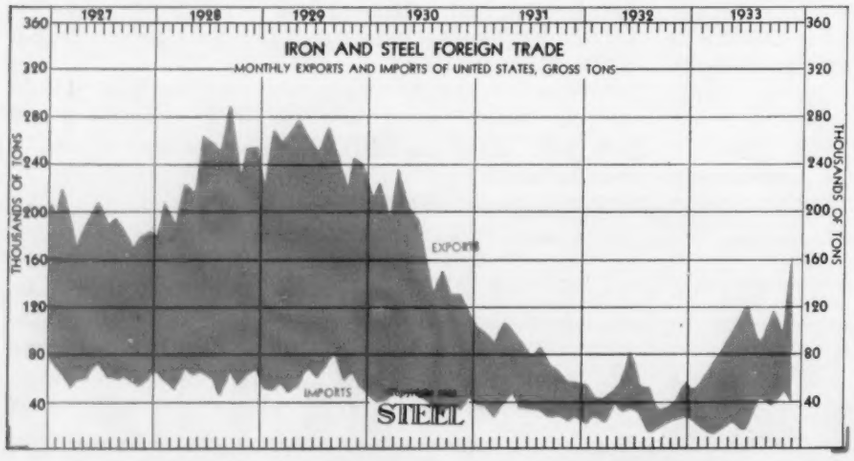
A favorable trade balance totaling $43,000,000 appears in the report of this country's foreign merchandise trade in October. The total value of goods exported was $194,000,000, while imports advanced slightly to $151,000,000. In October, 1932 there was a favorable trade balance of $47,591,000 with exports aggregating $153,090,000. The excess of exports over imports in the ten months this year is $111,380,000, which compares with $219,349,000 in the same period of 1932.

Industrial Production Declines For Third Consecutive Month

Industrial production in the United States during October declined 7 points from the revised figure of the preceding month. According to statistics compiled by the Federal Reserve board the index for October was 77, adjusted for seasonal variation. This compares with 84 in September and 67 in October one year ago. Declines in production were quite general throughout the month. The iron and steel production index for October was 61 against 66 in September and 31 in October last year.



October, 1933	77
September, 1933	84
October, 1932	67



Exports	Tons	Imports	Tons
October, 1933	164,755	October, 1933	46,673
September, 1933	108,799	September, 1933	55,706
October, 1932	41,226	October, 1932	33,693

Steel Exports Highest Since 1930; Imports Down

This country's export trade in iron and steel products during October advanced 55,956 tons over the preceding month, for a total of 164,755 tons. This is the largest tonnage for any month since May, 1930, and advances the shipments for the ten-month period of 1933 past the million-ton mark, a total of 1,008,507 tons. Imports during the month amounted to 46,673 tons, a decline of 9033 tons from September. Imports in October last year were 33,693 tons.

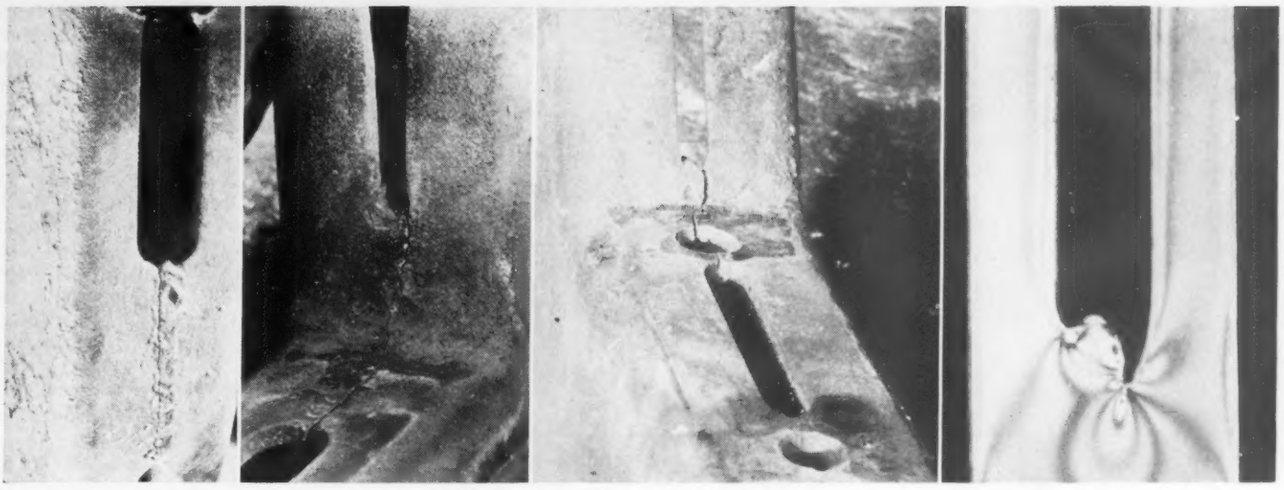


Fig. 1—A failure resulting from a slovenly job of welding. The fatigue crack centered about the stress concentration produced by a superfluous bit of weld metal which projected from an important boundary of the structure

DESIGNING WELDED STRUCTURES FOR HIGH EFFICIENCY OF JOINTS

Part I

BY EVERETT CHAPMAN

Lukenweld Inc.

THE science of structures is concerned with the economic distribution of elastic material to connect a load to its reactions over a reasonable length of time. Intimately associated with this broad subject are the various methods used to join the component members of the structure. While physical properties of elastic materials and engineering details of their distribution are important factors, this article is concerned primarily with the production of ideal welded joints.

Any structure built of pieces must necessarily act as a whole under its applied loads. Joint efficiencies, therefore, determine the action of the structure. As unit stresses are raised, high joint efficiencies become more and more important; and as the loading cycle becomes more and more frequent, homogeneous joints become imperative. Properly welded joints are more nearly homogeneous than any other type of connection between two pieces of material. Homogeneous joints are eminently desirable since they particularly affect the rigidity and fatigue performance of the structure.

Consider the two methods of supporting a load over a span, as exemplified in the sketches in Fig. 3. The usual truss and abutment arrangement is essentially a three-piece structure, connected by pin joints. The rigid frame bridge is a one-piece structure in which the transition from horizontal to vertical members is distinguished by the fact that this apparent joint can transmit bending moments. In the one-piece rigid frame bridge, the bending mo-

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PRECAUTIONS which must be observed in designing correct and efficient joints in welded steel structures were discussed at length in a paper presented at the fifty-fourth annual meeting of the American Society of Mechanical Engineers in New York, Dec. 5-7. This paper constitutes an important contribution to welding knowledge and because of its wide interest will be published in full in STEEL in two installments. Part I, appearing herewith, deals with joint failures and causes therefor as explained by photoelastic studies; Part II, to appear in an early issue, will suggest corrective measures through drafting room practice and heat treatment. Two articles by the same author in the Aug. 28 and Sept. 11 issues of STEEL discussed similar problems as applied specifically to the welding of rolled steel diesel engine structures. The author is vice president in charge of engineering, Lukenweld Inc., division of Lukens Steel Co., Coatesville, Pa.

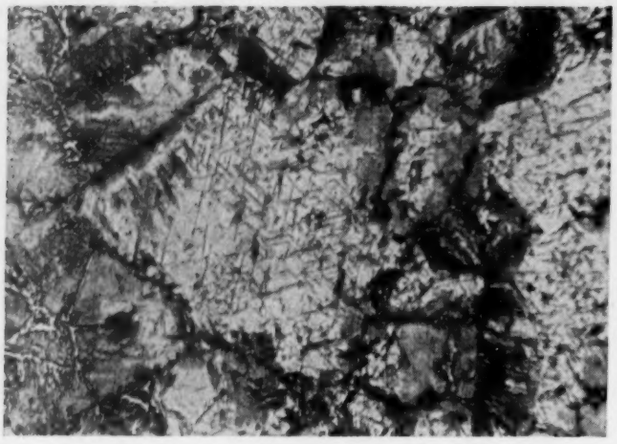


FIG. 2 — The transition zone between weld metal and 0.40 per cent carbon base metal. The large grain size indicates damage from the high temperature of the arc

ments are distributed uniformly over the entire structure. Vertical and horizontal members interact to redistribute the bending moments. When, as in this case, adjacent members interact through a rigid junction, the redistribution of bending moments may effect an economy of material running as high as 30 per cent. Considered broadly, the type of joint at the knee of the one-piece rigid frame bridge, shown in the lower part of Fig. 3, is the joint inherent in a properly welded design.

Two plates can be welded together so that the joints as such vanish. A homogeneous joint, or transition between two pieces of material, is a joint whose elastic behavior cannot be distinguished from that of the same configuration cut from a single piece of material. In the unattainable ideal, the maximum stress would have the same value as the average stress. It is thus indicated that a definite though intangible advantage continually permeates the welded steel structure. Since the joints can be made so that the continuity of rigidity is preserved perfectly in the transition from one member to another, the structure will act as an elastic entity. The fact that this ideal can be approached closely in welded joints has two implications for the structural designer.

Inertia Moment Is Lower

First, as has been mentioned, is the fact that continuity can be taken into consideration in the design of gross structures such as bridges and buildings in which the moment of inertia of each member is much less than the corresponding constant for the whole structure. Welded design is eminently adapted to the curvilinear structures which result when continuity of elastic action is considered in the design. The second implication is that the behavior of the properly welded structure, under impact and fatigue load, is similar to that of a jointless structure as far as service life is concerned. The entire structure's resistance to severe loading conditions represents the thoroughly consolidated resistance of its components.

A homogeneous joint has two characteristics. First, the material comprising the joint must have uniform physical properties from point to point; it must not have been damaged in any respect by the fabricating process. Second, the distribution of stress throughout the joint, from point to point, should be of maximum uniformity. A perfect distribution of stress over the joint is also an unattainable ideal since the joint at its best represents an abrupt change in contour.

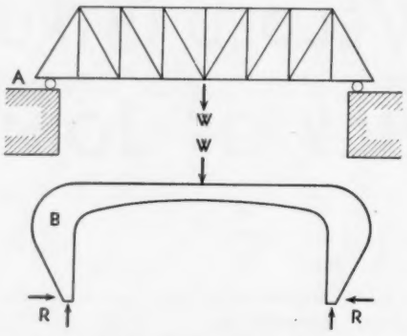


Fig. 3—Sketch indicating two methods of supporting a load over a span. Above is a three-piece truss and abutment arrangement; below is a one-piece rigid frame

With a homogeneous joint of the desired characteristics, the two members are joined in such a manner that neither the elastic action nor the plastic action of the composite is distinguishable from the action of a single piece. Again, the joint has vanished.

Three Controlling Factors

Three factors control the two desired characteristics of the homogeneous welded joint. First, the parent metal is damaged by the extreme heat of the welding operation. Fig. 2 shows the transition zone between weld metal and 0.40 per cent carbon base metal. The large grain size is indicative of the high temperature to which the parent metal has been raised by the heat of the arc. The metallic heat path to the body of cold parent metal forms an excellent thermal sink and the resulting rapid heat flow away from the weld thoroughly quenches the heated zones around the weld. The net result is a zone of highly overheated and quenched material adjacent to the weld. The severity of damage in this zone is a particular function of the carbon content of the parent metal, or more generally, a function of the air-hardening ability of the steel.

This damaged zone, whatever its extent, represents a discontinuity in physical properties, since the large, overheated grain is decidedly weak in resistance to fatigue and impact. In addition, the hardened microconstituents, due to the quenching action, are very strong, but they lack the ductility necessary to compensate for the thermal stresses to which the piece

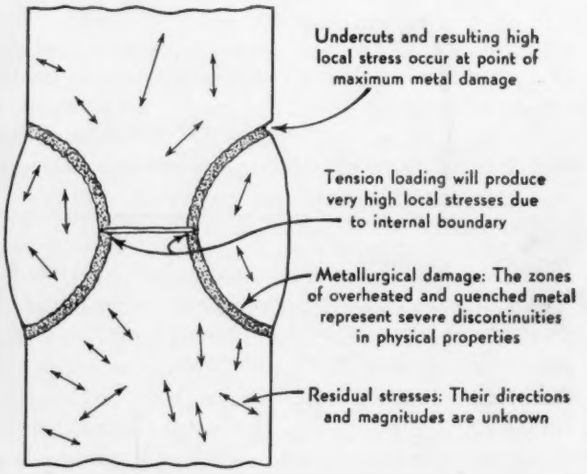

Undercuts and resulting high local stress occur at point of maximum metal damage
Tension loading will produce very high local stresses due to internal boundary
Metallurgical damage: The zones of overheated and quenched metal represent severe discontinuities in physical properties
Residual stresses: Their directions and magnitudes are unknown

Fig. 4 (Left)—Photoelastic study of an improperly designed welded butt joint. The two welds, deposited from each side, do not meet at the center. Fig. 5 (Right)—Graphical representation of an improperly executed welded joint—physical properties are not uniform from point to point

is subjected in the welding operation. The joint may crack through the damaged zones during fabrication and this phenomenon may be carried over into the service behavior of the structure if the damage is not corrected.

Second of the factors controlling the production of homogeneous welded joints is the design of the joint itself. It is the rule rather than the exception that stress concentrations of a very severe nature may exist in the joint. Fig. 4 shows the heterogeneous stress condition which exists in an improperly designed welded joint. This photoelastic study represents a loaded butt joint between two pieces of metal of equal thickness.

Stress Variations Too High

The two welds, deposited from each side, did not meet at the center. The unfused portion forms an internal boundary which produces an extreme variation in stress over the joint. At the end of this crack, the stresses are extremely high. In addition, intermediate high stresses exist at the ends of the reinforcements which are usually, and vainly, applied in order to strengthen this type of joint. Such reinforcements are effective only under static load; under impact or fatigue loads, the changes in contour at the ends of the reinforcements introduce additional stress maximums.

Third of the factors influencing the production of homogeneous welded joints is the element of residual stress introduced in the structure through contraction of cooling weld metal. Little is known of the direction or magnitude of these thermal stresses. There is direct evidence, however, that the residual stresses may in many cases exceed the yield point of low-carbon steel.

When a known service load is superimposed on a structure which is already loaded by residual stresses in an indeterminate manner, the elastic conditions which exist from point to point are highly chaotic. The structure may be so highly preloaded that its permissible load in service is only a small fraction of the designed load. Structures, the natural shape of which is such that the stresses are self-locking, often fail through the partially completed welds during fabrication, due to some shop handling condition —such as hammering or dropping— which applies even a small shock load to the structure. This behavior is not due to "brittle welds," as has been commonly supposed.

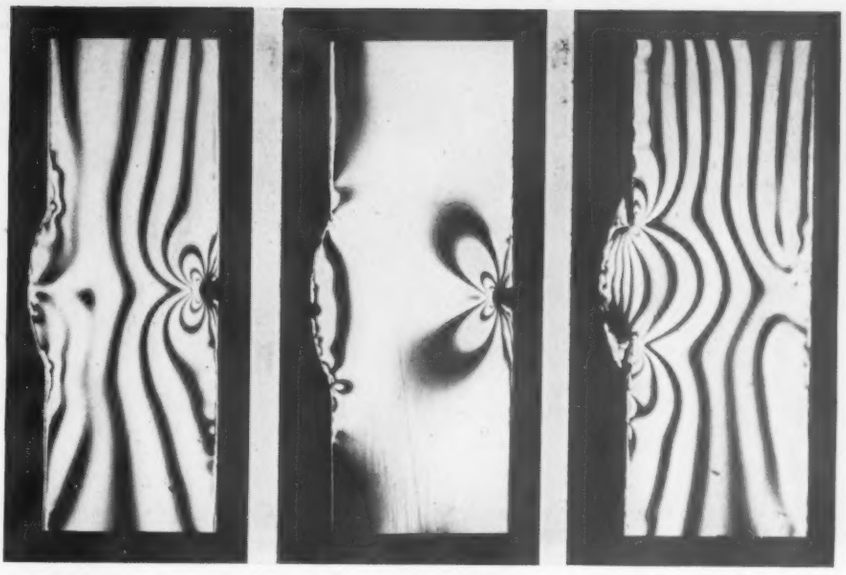


Fig. 7 (Left and center)—Stress distribution usually found in welds made from one side of a plate. Penetration of weld metal cannot be completely controlled from one side. Fig. 8 (Right)—The overlap, in which weld metal runs onto the plate surface and solidifies without fusing, is another common defect

Warping Often Occurs

In addition to the elastic chaos that residual strains may produce in a welded structure, severe warping will occur when the strains are relieved, either in the machining operation or by a gradual creep over a period of time. A battery of machines, in which proper functioning depended upon maintained accurate alignment, was rendered progressively ineffective as the machine housings gradually crept out of shape. In two years, the machines were useless.

Fig. 5 represents graphically the abortion which can result from the improper execution of a welded joint. This joint is far from homogeneous. Physical properties are not uniform from point to point, since there are zones of badly damaged metal. The stress values throughout the joint when loaded vary tremendously from point to point, because, in addition to the stress concentrations which exist at internal and external boundary discontinuities, the unknown residual stresses add to the concentrated load stresses, and thus produce utter chaos.

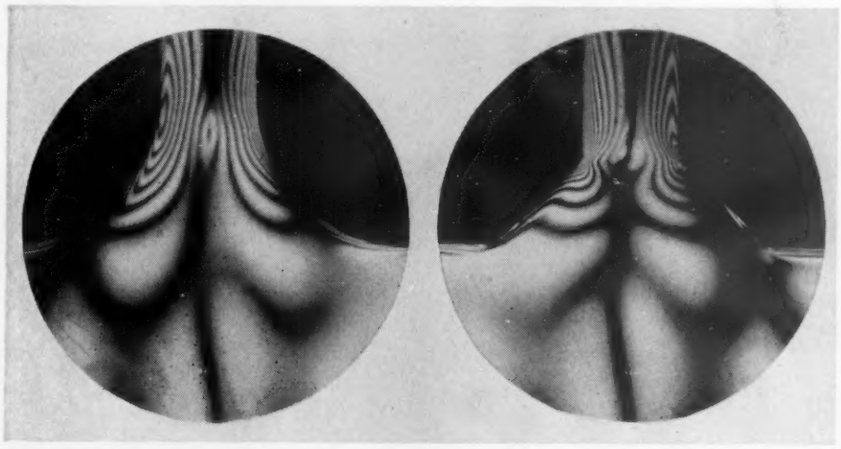


Fig. 6—Contrasting conditions around a fillet weld with concave contour and another with triangular cross section. The triangular throat weld has a low average stress but a high maximum stress because of abrupt change in contour. The concave throat weld has high average stress but low maximum stress and better distribution

Parent Metal Damaged

Note the points of extreme stress concentration at the ends of the internal boundary, the points of lesser stress concentration at the ends of the reinforcment and around the undercut. Zones of badly overheated and quenched parent metal surround the weld metal. The situation is aggravated further by the co-existence of damaged material and high stress at the same place. The undercut localizes a high stress at a point where the parent material is in its poorest condition.

Whenever a welded joint, whatever its type, functions in a nonhomogeneous manner, one or more of three destructive factors are operating—sharp changes in contour, damaged material, and preloading. For example,

Fig. 9—Stress distribution resulting from an unwelded internal boundary on brittle weld metal (left) and ductile weld metal (right). The ripping action starts from the inside and reduces the apparent strength of the joint materially

Fig. 7 represents stress distribution usually found in welds made from one side of a plate. Such welds frequently introduce ragged contours, since the form of penetration of the weld metal cannot be controlled completely from one side. Where the design of the structure is such that welding from both sides is impractical, the use of backing-up strips permits the production of a compromise contour which is at least predictable.

Fig. 8 illustrates the stress distribution around another common type of defect, overlap, which often occurs at the hands of an inexperienced welder. It is caused by running over of the molten weld metal on to the surface of the plate, where it merely solidifies instead of fusing with the parent metal.

Weld Contour Important

Fig. 6 emphasizes another of the many forms of vicious stress distribution that may creep into a structure. It contrasts the stress conditions around a fillet weld having a concave contour with that around a fillet weld having a triangular cross-section. The triangular throat weld, while having a lower average stress due to its greater throat dimension, has higher maximum stresses because of the abrupt change in contour that it represents. The concave throat weld has a smaller throat area and therefore possesses a higher average stress, but its points of maximum stress are considerably lower than those in the triangular throat weld.

There are many instances permeating the entire machine design picture in which the proper procedure to rectify a succession of fatigue failures is to remove metal rather than make addition to the existing section. The effect of removing metal properly is to raise the average stress a few per cent, while making a reduction of several hundred per cent in the values of the maximum stress. The concave throated weld fillet is a case in point. The concave throat contour provides the most uniform distribution of stress and is the closest approach to the ideal that can be obtained in practice. The conventional term, throat dimension, has no meaning in this case since the technique involved in removing the internal boundary consisted of welding completely through the joint.

Fig. 1 shows a failure resulting from a slovenly job of welding. The fatigue crack centered about the stress concentration produced by an extraneous bit of weld metal carelessly left by the welder to project from an important boundary of the structure. It should be noted that the doubly aggravated condition which exists when a point of high stress coincides specifically with a zone of badly damaged parent material is the rule rather than the exception in all of the joints illustrated.

Ductility Gives Higher Strength

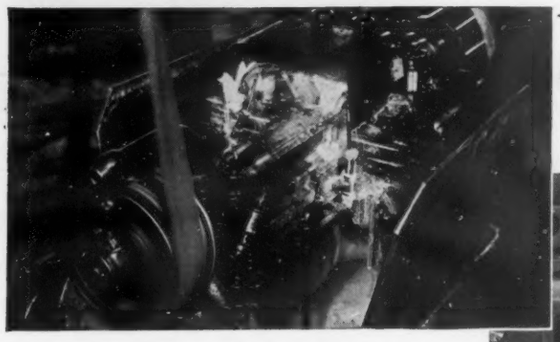
Fig. 9 contrasts the action of the poisonous stress distribution resulting from an unwelded internal boundary on a ductile and on a brittle weld metal. The ripping action which starts from the inside reduces the apparent strength of this joint materially. The brittle weld metal shows a fracture without an attendent change of shape while the ductile material, through a plastic deformation at the points of high stress, enables the structure to change its shape to a degree which materially raises the actual strength of the joint.

Fig. 10 illustrates the same combination of effects occurring in a fillet welded joint. Compare the actual behavior of the joint under a tensile load with the stress distribution as shown in the photoelastic study. The ductility of the weld metal in this case allowed a sufficient correction of contour at the points of maximum stress so that the failure actually occurred some distance away from the joint. It should be emphasized that the mechanism of ductility is not available for the correction of structural discrepancies in cases where the load is of a repeated nature.

(To be concluded)

Practical aspects of copper-hydrogen electric welding are outlined in a 16-page illustrated booklet recently published by the Bundy Tubing Co., Detroit. Examples of hydrogen welded assemblies are shown and tests made on these parts described Copies of the booklet may be obtained upon request to the company.

Fig. 10—An improperly made fillet welded joint. Actual behavior of the joint in tension is shown at the right. Ductility of the weld metal caused the failure to occur at some distance from the joint. Photoelastic study of such a joint is shown at the right



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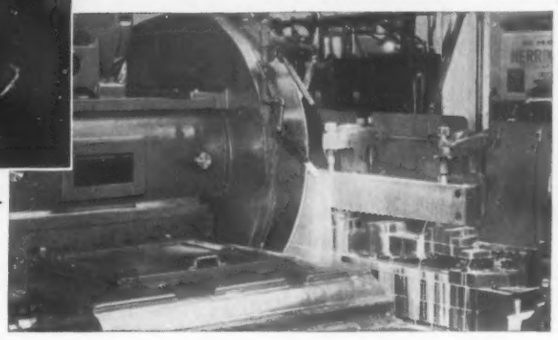
MACHINE: 4-SPINDLE ACME AUTOMATIC.
SPEED: 2400 R. P. M.
PRODUCTION: 4200 PIECES PER HOUR
LUBRICANT: 1 PART SUNOCO TO 12 PARTS WATER.
Courtesy of Canadian Acme Screw & Gear, Ltd., Toronto, Canada



OPERATION: GRINDING LOCOMOTIVE GUIDE BAR.→
MACHINE: No. 630 UNIVERSAL GRINDER, REVOLVING FIXTURE.
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Engineering Must Maintain Social Structure Balance

WIDENED responsibilities for engineers were foreseen by A. A. Potter, dean of engineering, Purdue university, West Lafayette, Ind., retiring president of the American Society of Mechanical Engineers, in addressing the fifty-fourth annual meeting of the society in New York, Dec. 5-7.

Having developed the necessary technique for almost unlimited wealth, the engineer, he said, can "no longer afford to stand aside while financiers, promoters and politicians so tragically bungle the problem of its distribution.

"Primarily engineering must deal with the technological problems of research, development, design, production,testing and operation. Yet the engineer is becoming more and more interested in finance, and is to an increasing extent the directing head of industry and of public works."

"Enginering," Dean Potter added, "is inevitably headed toward responsibility for maintaining that balance in the social structure which modern conditions have some times so violently upset; also toward active participation in political affairs where clear thinking and courageous action are so badly needed."

Cite Progress in Various Fields

Advancement in various phases of mechanical engineering was clearly indicated by convention speakers. Despite pessimistic forecasts in some quarters regarding the economic value of improved machine tools and machine shop processes in the light of certain economic philosophies developed in Washington, the consensus appeared to be that the machine tool industry stands to benefit.

Like all capital goods industries, the machine tool industry has been one of the most acute sufferers during the depression, but, it was said, with the engineering industry as a whole faced with shorter hours, higher rates of pay, more competitive conditions and a price minimizing which cuts out certan undesirable elements of competition, high quality of product is essential, and this means good machine tool equipment.

Uncertainty regarding economic effects of NRA has had an adverse affect during the latter part of the year on the purchase of new machines, it was admitted. But even in times like these when the country's oldest traditions are under critical review, it was said the basic principle of sound business still operates, that is, the best way to stimulate and then produce a sound market is to offer a meritorious product at a reasonable price; and this inevitably leads to more modern equipment.

Probably the most outstanding development in new machine tools, according to the machine shop practice division's progress report for 1933, is the application of external broaching to the shaping of many parts formerly considered a work for the planing machine, the milling machine and the lathe. In metal cutting research the outstanding recent accomplishment was said to be the work done by Prof. Friedrich Schwerd, Hanover, Germany. With the use of special equipment, Prof. Schwerd has been able to photograph chip formation when cutting steel, brass and aluminum, at relatively high speeds, using exposure of less than a millionth of a second, thereby getting sharp photographs even when enlarged as much as 50 times.

Developments in the field of metal cutting machinery and tools, it was stated, have progressed somewhat slower than normally, but some work of major importance has been done in the field of drilling, especially for drilling deep holes of small diameters in steel. This has been accomplished by drills having a spiral angle of about 40 degrees, instead of the customary 22 to 30 degrees, and with the use of hydraulic feed mechanisms arranged to rapidly remove the drill from the hole several times so that chips may be washed away.

Under the competitive leash, the cast iron founder has contributed more developments during the past two years than has been the case for many years previously. These developments, it was revealed, have been obtained largely through heat treatment, alloys, carbon control and melting methods. Through these means, high test and special cast irons are being made, some with tensile strengths up to 80,000 pounds per square inch.

Alloy irons have been developed to withstand temperature up to 1650 degrees Fahr., contrasted with plain irons which begin to grow at about 650 degrees Fahr. These alloy irons have found special application in the production of automotive brake drums, camshafts and crankshafts. A notable advance in specifications has been made by the adoption by the American Society for Testing Materials of tentative specifications for plain iron.

New Deal for Steel Castings

Betterment in the melting and heat treating procedures has been obtained by steel casting producers as a result of experimentation in the production of low alloy steel castings. A committee of the American Foundrymen's association, it was stated, is evolving for presentation to steel casting makers a classification scheme based on chemical composition and intended to eliminate confusion among buyers. Plain carbon and special alloy steel castings, it was brought out, are now being produced commercially with tensile strengths ranging from 60,000 to 200,000 pounds per square inch, and at the same time permitting a degree of ductility and shock resistance adequate for any prescribed purpose.

Satisfactory results were reported by producers of malleable castings, under the recently adopted dual

(*Please turn to Page* 34)

A. S. M. E. Elects Officers, Makes Medal Awards

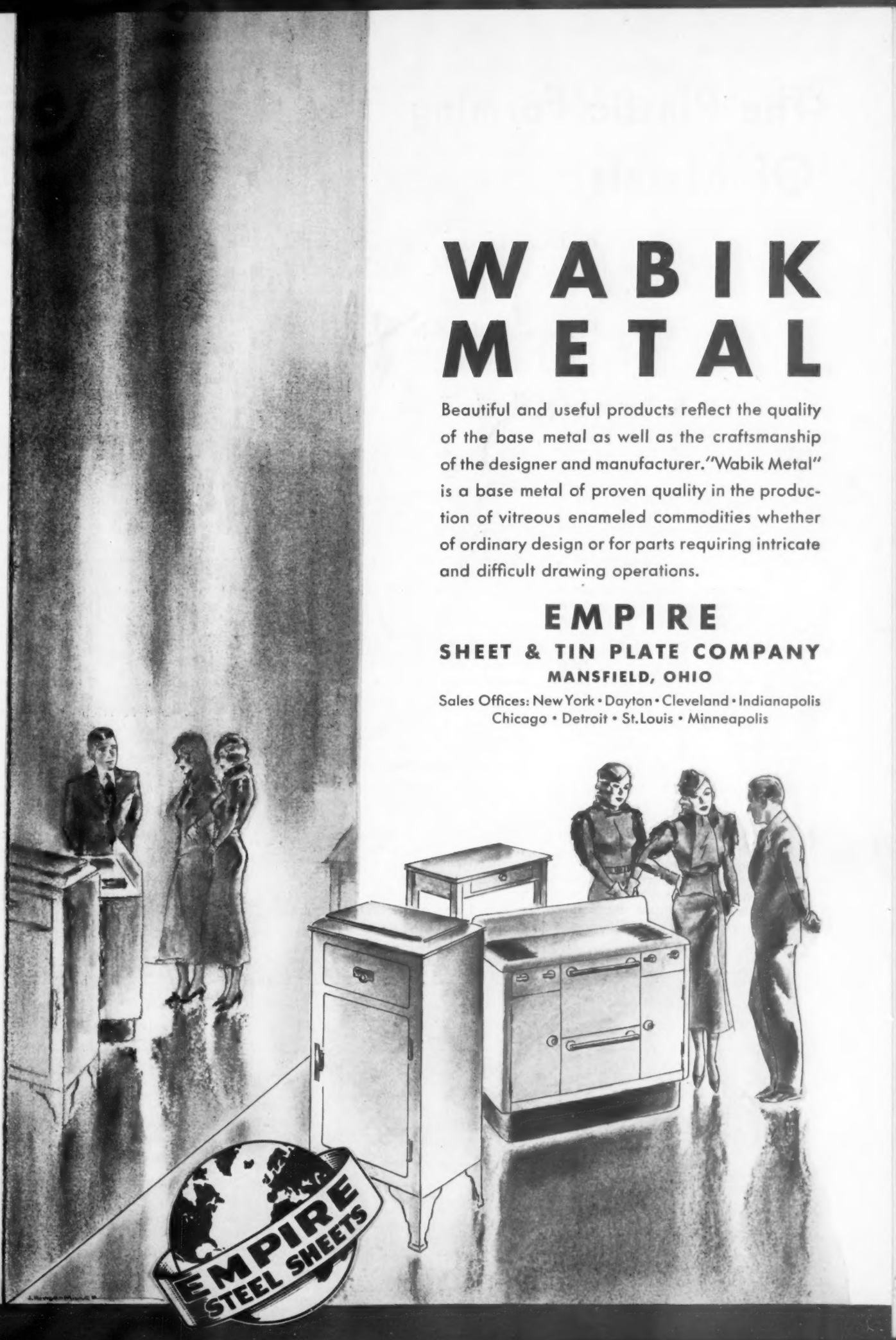
PAUL DOTY, chairman of the Minnesota state board of registration, St. Paul, succeeds A. A. Potter, dean of engineering, Purdue university, West Lafayette, Ind., as president of the American Society of Mechanical Engineers (see p. 15).

New vice presidents are H. L. Doolittle, designing engineer, Southern California Edison Co., Los Angeles; W. L. Batt, president, S. K. F. Industries Inc., New York; E. C. Hutchinson, president, Edge Moor Iron Co., Edge Moor, Dela.; and E. H. Whitlock, professor of mechanical engineering, Stevens Institute of Technology, Hoboken, N. Y.

J. M. Todd, consulting engineer, New Orleans; E. L. Ohle, professor of mechanical engineering, Washington university, St. Louis; and J. A. Hall, professor of mechanical engineering, Brown university, Providence, R. I., have been elected managers.

The A. S. M. E. medal for 1933 *was conferred upon Ambrose Swasey, Cleveland, past president and honorary member of the society, for his contributions to the advancement of the engineering profession and for his part in the development of the turret lathe and astronomical telescope.*

Dexter S. Kimball, dean of engineering, Cornell university, Ithaca, N. Y., and past president of the society, was awarded the Worcester Reed Warner medal for his contributions in efficiency and management. The Melville medal for 1933 *was awarded to W. E. Caldwell, research engineer, United Electric Light & Power Co., New York, for his papers on "Characteristics of Large Hell Gate Direct-Fired Boiler Units."*



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The Plastic Forming Of Metals

By PROFESSOR DR.-ING. ERICH SIEBEL
Translated by JOHN H. HITCHCOCK

Part II—Forces and Flow of Material in Technical Forming Processes

3. Phenomena of Flow in Rolling

TO DETERMINE the effects of temperature and other rolling conditions upon the deformation resistance and the course of deformation, three series of tests were made at each test temperature, with ratios of final thickness of bars to roll diameter of 20:178 = 11.2 per cent, 10:178 = 5.6 per cent, and 5:178 = 2.8 per cent. These three series are designated respectively as tests I, II, and III. In each test series, rolling was done with five different drafts per pass; the drafts in series I being approximately 0.39, 0.31, 0.24, 0.16, and 0.08-inch corresponding to 33, 28, 23, 17 and 9 per cent. The drafts in series II were the same in absolute dimensions, and corresponded to 50, 44, 37, 28, and 17 per cent reduction; while those in series III were 0.20, 0.16, 0.12, 0.08 and 0.04-inch corresponding to 50, 44, 37, 28 and 17 per cent reduction. Because two identical tests were made in each case, and because rolling was done at temperatures of 1292, 1472, 1652, 1832, 2012 and 2192 degrees Fahr., the entire program consisted of 180 tests. The test material was a soft open-hearth steel containing 0.08 per cent carbon. The initial width of bar in all tests was 1.18 inches.

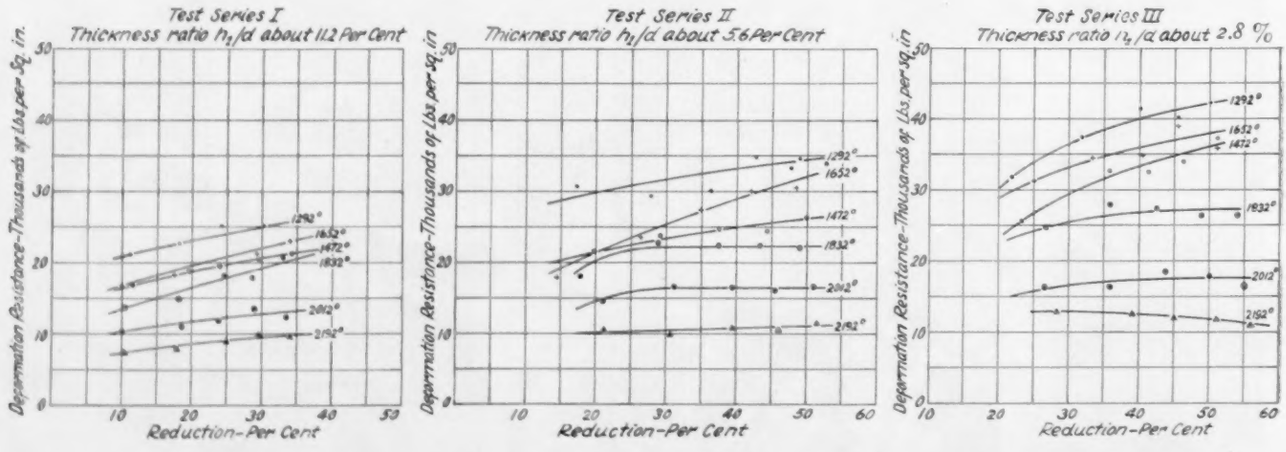
The deformation resistance, determined under the various test conditions as the quotient of the measured separating force and the area of contact between rolls and bar, is shown in Figs. 37 to 39 in relation to the reduction per pass. To compensate for the errors introduced by experimental inaccuracies, average values of the deformation resistance, determined from similar tests, were plotted; and corrected curves were drawn for the various test temperatures, which probably correspond to the true variation of the deformation resistance under the assigned test conditions.

Pass Reductions Are Small

In test series I, all corrected curves rise with increasing reduction per pass. The relative reductions in this series lay between 10 and 34 per cent, and were accordingly smaller than those in the other tests. With small reductions, the rate of recrystallization in this case appears still to be so small that an appreciable flow hardening of the rolled material occurs with increasing deformation, even at the highest test temperatures. The deformation resistance accordingly rises with increasing deformation.

In test series II and III, at test temperatures from 1832 to 2192 degrees Fahr., the deformation resistance became almost constant when the reduction of thickness exceeded 30 per cent. In test series III a slight diminution of the deformation resistance was observed, even with the most severe reductions. The rate of flow hardening and the velocity with which the original strength is restored by recrystallization, accordingly, almost maintain equilibrium at high temperatures and with large reductions. In all test series, a diminution of the deformation resistance at 1472 degrees Fahr. can be observed distinctly, in comparison to that at 1652 degrees Fahr. Below 1472 degrees Fahr. the deformation resistance again increases rapidly. The tests accordingly confirm the observation of E. Houdremont and H. Kallen[38], that the deformation resistance of mild steel decreases during the transformation from the γ -region to the α -region, and the results show that this discontinuity appears in the same manner in rolling as that described for compression tests, in Part I.

In order to illustrate still more clearly the effect of temperature on the variation of the deformation resistance, the latter is shown in Figs. 40 to 42 as a function of temperature, for various test conditions. The values of deformation resistance, which are indicated for reductions of 10, 20, 30, 40 and 50 per cent, were taken from the corrected curves of Figs. 37 to 39. These groups of curves show distinctly the large increase of deformation resistance with falling temperature in the γ -region. During the transformation into the α -region, for the reasons already mentioned, a diminution or a diminished rate of increase of the deforma-



Figs. 37, 38 and 39—Resistance to deformation in the hot rolling of mild steel, in relation to reduction per pass

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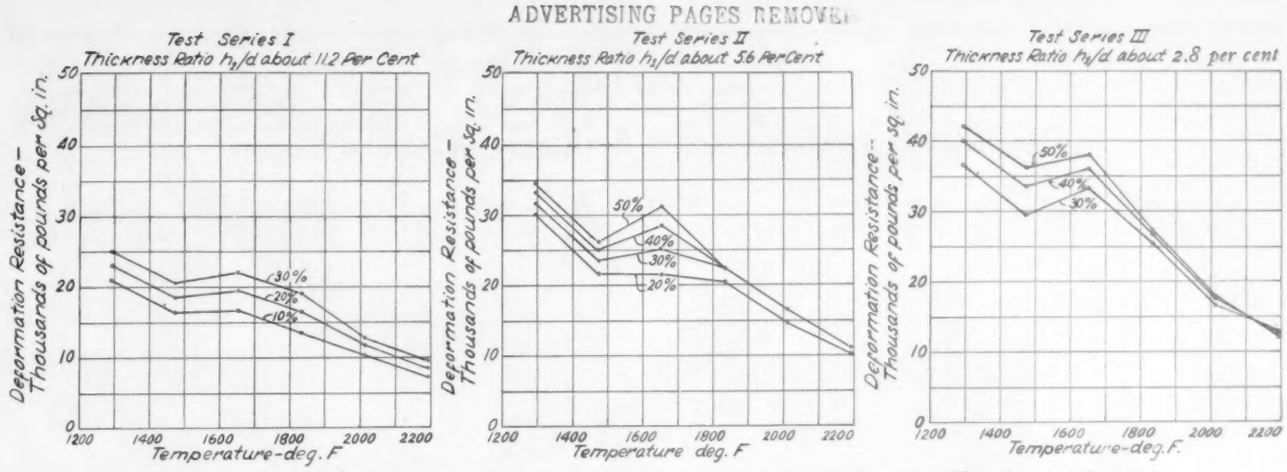

Figs. 40, 41 and 42—Resistance to deformation of mild steel in relation to rolling temperature

tion resistance then is observed, and below 1472 degrees Fahr. the deformation resistance again increases rapidly. The influence of the reduction per pass, as long as this factor remains small, also is indicated here; whereas, if the reduction exceeds 30 per cent, the individual curves almost coincide above 1832 degrees Fahr.

The influence of the ratios of strip thickness to roll diameter on the deformation resistance is made manifest in Fig. 43. Here the temperature-deformation resistance curves of tests series I to III, corresponding to a reduction of 30 per cent per pass, are drawn together. The illustration shows that the deformation resistance under otherwise equal conditions becomes the greater, the smaller the thickness of the rolled material is in comparison to the roll diameter. Because of the fact that the cooling of relatively thick material by contact with the rolls is limited to the outer surface zones, this phenomenon is attributed principally to the increased resistance which the displaced material encounters in flowing out along the rolls.

The influence of the deformation velocity cannot be determined from these tests, because they were conducted with the same roll speed throughout. This influence probably

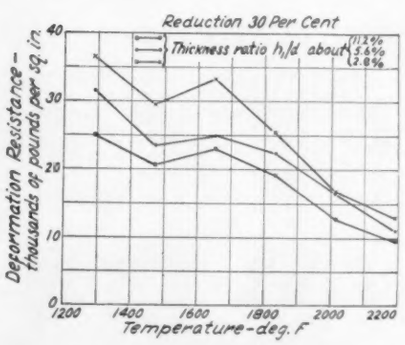

Fig. 43—Resistance to deformation of mild steel with a reduction of 30 per cent, and with various thickness ratios

can be estimated, however, by comparison between the observed course of the deformation resistance for about 30 per cent compression in test series I, according to Fig. 44, and the values found by H. Hennecke[47] for equal compression in static and dynamic compression tests, as given in Figs. 14 and 15. In test series I, the frictional effects were probably about the same as those in the compression tests described, because the thickness ratios correspond approximately to one another. A comparison of the various test values therefore appears to be permissible.

Time Required for Deformation

Reduction of thickness of 30 per cent, corresponding to a deformation of approximately 35 per cent, was performed in six seconds in the compression test under the press, in 0.09-second in the rolling test, and in 0.005-second in the compression test under the hammer. In the rolling tests, the deformation velocity accordingly lay between those of the static and dynamic compression tests. The curve of deformation resistance in the rolling tests, correspondingly, lies between those of the static and dynamic compression tests. Inasmuch as the rolling speed in hot-rolling increases up to 2000 feet per minute and the deformation velocity can amount to many times the values investigated here, an increase of the deformation resistance almost up to the value for the dynamic compression tests must frequently be encountered.

It is pertinent to compare the rolling tests conducted by J. Puppe[48] with the previously described rolling tests. In Table III several bloom-rolling tests have been evaluated for this purpose, in which the first pass of each test is not considered because of the conicity of the ingot. In column 8 the area of contact is determined from the length of contact and the average width of the bloom. Finally, the deformation resistance in column 10 is determined from the measured separating force (column 9) and the area of contact. Column 11 gives the ratio of thickness of bloom to roll diameter.

The thickness ratio in the rolling of blooms is extraordinarily high, and varied in these tests from 43 per cent in the first pass to 13 per cent in the last pass tested; whereas in series I of the author's tests it amounted to about 11 per cent, and was still much smaller in series II and III. The values of deformation resistance found in test series I, therefore, may be expected to exceed those of Puppe's tests. This is indeed the case, as a comparison with Figs. 40 to 42 shows, especially in the first passes with large thickness ratios. In the later passes, some of the values from test series I are slightly exceeded, which is probably due to the higher rolling speed. On the whole, however, the agreement is gratifying.

In the rolling of sections other than square, the average thickness

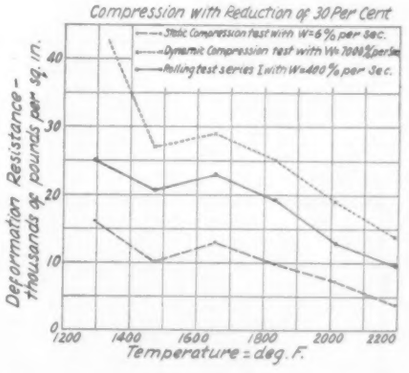
Compression With Reduction of 30 Per Cent
Static Compression test with W=6% per Sec.
Dynamic Compression test with W= 7000% per Sec.
Rolling test series I with W=400% per Sec.
Deformation Resistance — thousands of pounds per sq. in.
Temperature - deg. F.

Fig. 44—Comparison of rolling tests on mild steel with dynamic compression tests made by H. Hennecke

[48] J. Puppe: Versuche zur Ermittlung des Kraftbedarfs an Walzwerken; Stahleisen m. b. H., Dusseldorf 1909; —Versuche uber Walzdrucke an einem Blockwalzwerk; St. u. E. 30(1910)p.1823/1871;—Untersuchungen uber Walzdruck und Kraftbedarf; Stahleisen m. b. H., Dusseldorf 1913.

Table III

Determination of Deformation Resistance in Rolling Blooms*

1	2	3	4	5	6	7	8	9	10	11
Pass No.	Cross section, inches	Temperature deg. Fahr.	Area of cross section Initial sq. in.	Area of cross section Final sq. in.	Reduction of area Absolute sq. in.	Reduction of area Relative per cent	Area of contact sq. in.	Average roll force lbs.	Deformation resistance lbs./sq. in.	Thickness ratio per cent
5	15.74 x 15.51	1987	243	226.9	16.30	6.7	70.83	581,500	8,260	43
7	16.06 x 13.10	1987	210.6	194.0	16.60	7.9	71.30	598,000	8,390	36
9	10.74 x 16.41	2012	177.0	162.4	14.6	8.2	55.50	546,200	9,850	44
11	11.06 x 13.30	2091	147.1	131.5	15.6	10.6	56.75	611,800	10,780	35
13	10.23 x 11.37	2091	116.4	90.0	26.4	22.7	73.20	708,600	10,440	23
15	6.77 x 10.54	2104	71.5	58.1	13.4	18.7	44.03	526,300	11,960	22
17	6.73 x 7.08	2057	47.8	41.5	6.3	13.0	30.85	432,400	14,020	16
19	5.16 x 7.04	2012	36.35	28.25	8.1	22.3	30.69	453,000	14,760	13
5	15.74 x 15.51	2129	243	226.7	16.3	6.7	70.83	405,000	5,720	45
7	16.06 x 13.10	2154	210.6	194.0	16.6	7.9	71.30	514,600	7,220	36
9	10.74 x 16.41	2154	177.0	162.4	14.6	8.2	55.50	475,100	8,560	44
11	11.06 x 13.30	2179	147.1	131.5	15.6	10.6	56.75	496,000	8,750	35
13	10.23 x 11.37	2179	116.4	92.4	24.0	20.6	70.04	664,000	9,480	24
15	6.77 x 10.54	2192	74.4	60.2	14.2	19.2	46.35	455,200	9,830	22
17	6.73 x 7.08	2179	50.1	41.7	8.4	16.8	35.33	360,000	10,190	16
19	5.16 x 7.04	2154	36.8	28.3	8.5	23.1	31.61	374,100	11,839	13

*According to measurements of roll force by J. Puppe in St. u. E. (1910) p. 1823.

of the cross section can be determined as the quotient of the cross-sectional area and the total width of the section. The average length of contact is determined as the square root of the product of the difference between the average thicknesses and the average roll radius. Finally, the area of contact, as a first approximation, is determined as the product of the width and the length of contact, calculated as previously described. It is thus possible to obtain data regarding the deformation resistance even in the rolling of shapes, as soon as measurements of separating force are available.

In Table IV, Puppe's investigations of the separating force and the power requirement in the rolling of billets, angles, channels, and I-beams are evaluated for the purpose mentioned, but for the sake of brevity, each series of tests is evaluated only for the first ingot. The width of the section after each pass can be determined from the test sketches, as well as from the roll drawings, and then the average thickness of the cross section can be calculated. In order

Table IV

Determination of Deformation Resistance in Rolling Billets and Shapes*

1	2	3	4	5	6	7	8	9	10	11
Pass No.	Shape of cross section	Temperature deg. Fahr.	Area of cross section Initial sq. in.	Area of cross section Final sq. in.	Reduction of cross section Absolute sq. in.	Reduction of cross section Relative per cent	Area of Contact sq. in.	Average Roll Force lbs.	Average Deformation Resistance lbs./sq. in.	Average Thickness Ratio
Ingot No. 1, Test No. I, 22½-inch 3-High Mill, Stand No. 1, Rolling 2 x 2-in. Billets.										
2	Rectangle	2197	54.3	45.8	8.50	15.6	24.8	255,200	10,290	32.6
4	Rectangle	2172	39.1	35.8	3.29	8.4	13.6	176,400	12,970	35.1
6	Diamond	2124	31.0	27.16	3.84	12.4	17.35	227,100	13,090	20.5
8	Diamond	2113	20.61	17.32	3.29	15.9	13.49	261,900	19,400	16.0
10	Diamond	2084	12.40	9.83	2.57	20.8	8.75	229,300	26,210	11.7
12	Diamond	2102	7.02	5.73	1.29	18.5	6.51	164,500	25,280	8.6
Ingot No. 1, Test No. II, 22½-inch 3-High Mill, Stand No. 1, Rolling 2⅜ x 2⅜-in. Billets.										
2	Rectangle	2210	54.7	46.2	8.53	15.6	25.28	190,200	7,530	32.8
4	Rectangle	2185	39.4	35.0	4.37	11.1	15.80	167,700	10,610	34.4
6	Diamond	2185	31.5	26.7	4.84	15.4	18.98	183,000	9,650	20.2
8	Diamond	2160	21.2	16.8	4.45	21.0	15.42	199,700	12,940	15.5
10	Diamond	2147	12.5	9.6	2.89	23.0	11.16	171,600	15,380	11.4
12	Diamond	2147	7.31	5.45	1.86	25.4	7.82	132,700	16,970	8.3
Ingot No. 1, Test No. III, 22½-inch 3-High Mill, Stand No. 2, Rolling 2⅜ x 2⅜-in. Angles.										
2	Groove	2075	4.85	3.35	1.50	31.0	7.16	151,900	21,200	4.9
4	Groove	2005	2.39	1.94	0.45	18.8	3.95	102,700	26,010	2.8
Ingot No. 1, Test No. IV, 22½-inch 3-High Mill, Stand No. 2, Rolling 3½ x 3½ x ⅜-in. Angles.										
1	Groove	2113	19.06	14.33	4.73	24.8	16.12	238,800	14,800	15.3
3	Groove	2102	10.91	8.07	2.84	26.0	12.32	239,700	19,450	7.8
5	Groove	2097	5.43	3.97	1.46	26.8	9.15	193,100	21,100	3.6
Ingot No. 1, Test No. V, 22½-inch 3-High Mill, Stand No. 1, Rolling I-Beams N.P. 8.										
4	Groove	2223	26.98	22.53	4.45	16.5	14.72	176,300	11,970	25.0
6	Groove	2210	17.83	13.95	3.88	21.8	12.09	229,300	18,980	16.3
10	Groove	2172	6.26	4.94	1.32	21.1	6.44	129,400	21,630	7.8
Ingot No. 1, Test No. VI, 22½-inch 3-High Mill, Stand No. 2, Rolling I-Beams N.P. 12.										
1	Groove	2160	10.07	7.23	2.84	2.81	11.23	250,800	22,310	8.1
3	Groove	2124	5.83	4.03	1.80	28.2	9.45	252,900	26,760	4.2
5	Finishing pass	2043	3.07	2.40	0.67	21.7	6.05	235,200	38,900	2.3
Ingot No. 1, Test No. VII, 22½-inch 3-High Mill, Stand No. 2, Rolling I-Beams N.P. 14.										
2	Groove	2197	8.76	6.86	1.91	21.8	10.15	189,500	18,680	6.4
4	Groove	2147	5.52	4.47	1.05	24.2	7.75	223,800	28,880	3.9
6	Finishing pass	2017	3.63	3.10	0.53	14.5	5.74	277,300	48,300	2.6
Ingot No. 1, Test No. VIII, 22½-inch 3-High Mill, Stand No. 2, Rolling Channels N.P. 12.										
1	Groove	2160	10.36	7.52	2.84	27.4	11.70	268,800	22,970	8.3
3	Groove	2068	5.81	4.07	1.74	29.9	9.53	304,100	31,920	4.2
5	Finishing pass	2017	3.49	2.82	0.67	19.1	6.44	249,100	38,700	2.7

*According to rolling tests by J. Puppe.

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to permit a comparison with the test values shown in Figs. 40 to 42, the average ratio of thickness of bar to roll diameter is shown in column 11. Even in the rolling of billets, the resistance to flow in the groove and the increased rolling speed result in a considerable increase of the deformation resistance, over the values found in the rolling of flat bars. This increase appears to a great extent in the ordinary rolling of structural shapes.

(*To be continued*)

A. S. M. E. Sees Progress Giving New Prominence to Engineer

(*Concluded from Page* 26)

specifications of the American Society for Testing Materials. Special irons have been developed which, with a pearlitic or sorbitic base and temper carbon, give considerably higher tensile strength, and permit of special heat treatments for localized hardening for wear resistance.

Use of new light, strong alloy steels in the modernization of railroad equipment was described as almost limitless by Frederick D. Foote, assistant to vice president, United States Steel Corp., New York. He said the use of this material was the answer to the railroad's problem of meeting competition from motor-driven vehicles.

Introducing New Steels

He said the Steel corporation subsidiaries are now introducing a range of steels primarily for use by the railroad industry. The grade attracting the most attention is 18-8. The cost of the material is at the top of the list on a pound basis, but because of its properties, both physical and as a corrosion resistant, it may be that it will prove the cheapest for some of the more radical light-weight designs which are required by the railroads.

New problems to fuel engineers in the selection and application of the most economical fuel will result from changes made necessary under trade codes. These changes will be found in the relative prices of oil, gas, and coals. The full effects of these trade codes, it was said, will not be known for some time, but if they bring stability to the coal and oil industries, they will have a measure of a success that will far outweigh their shortcomings.

Interest in the use of luminous flames for industrial heating processes continues with a better understanding of the heat transfer from flames having been gained by papers on this subject presented at a meeting of the iron and steel division of the Society and a recent paper before the American Chemical society. The organization of the Bituminous Coals Research Inc. was described as the most important development in fuels research during the year.

Results of an experimental investigation in determining the relation of the rate of burning of pulverized fuels and of the radiation from their flames to the type of coal and its fineness of pulverization were presented by Ralph A. Sherman, Battelle Memorial institute, Columbus, O. After describing the equipment and materials used, he listed five results of his combustion studies and mentioned four conclusions with regard to radiation measurements. One of the latter was that a natural gas flame can be made so luminous, by inducing cracking of hydrocarbons, that its emissivity can be made greater than that of pulverized coal flames.

Discussing slags from slag tap furnaces, P. Nicholls and W. T. Reid, fuels section, United States bureau of mines, Pittsburgh, said that in general the flow temperature decreases with increase in the reduction of the iron in the slag; also that the effectiveness of a high ratio increases as the total iron in the slag increases. Declaring the relationship complicated, the authors presented data in convenient form for the use of plant engineers.

Furnace Linings Improved

Importance of lining in electric furnace design was stressed by R. D. Van Nostrand, General Electric Co., Schenectady, N. Y., at the heat transfer sessions. Development of light weight refractories has great influence, absorbing less heat and power with an advantage in re-radiation over some of the heavier lining materials. Mr. Van Nostrand also stated such refractory lining in electric furnaces allowed more rapid operation, illustrating by stating one special furnace had been designed by which it was possible to attain 2400 Fahr. in 4 hours, starting cold. Factors controlling radiation, location of resistors and re-radiation with the bottom of the charge shielded from re-radiation involved in electric furnace design, were outlined.

Heat transfer rates in fuel-fired furnaces were discussed by M. H. Mawhinney, fuel engineer, Electric Furnace Co., Salem, O. Stressing the importance of practical determination of furnace hearth size necessary to heat a given quantity of steel pieces of known size and shape, Mr. Mawhinney gave data, illustrated with charts, the results of numerous tests on various furnace installations. Except for boiler and still furnace applications, theoretical heat transfer data are complicated and have, as yet, little value in practice.

Summarizing the results of experiments, Mr. Mawhinney gave a concrete example on known stock to determine hearth area in furnace design: 10,000 pounds of steel pipes to be heated per hour, each 7/8-inch and 23 feet long, to be carried through a furnace separately on chains for fine heat treating. The outside area of each pipe is therefore 5.28 square feet, and, on 1½-inch centers there will be eight pipes of 42.24 square feet of receiving area in 1 foot of furnace length, or 25 square feet of furnace hearth, if 25 feet wide for 23-foot pipes.

W. H. Smith, Detroit, declared that in the automotive industry, the matter of heat transfer was as important as metallurgy; that the electric furnace permitted closer control, as low as five degrees in some heat treating. He urged mechanical engineers to enter more extensively into the investigation of metallurgy, saying they must know the metals to which heat is transferred to prevent the abuse of steel. He also called attention to the high percentage of scrap in many steels and the resultant influence on heat transfer and treating.

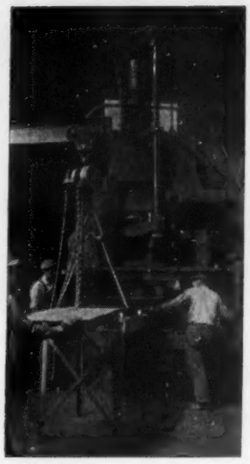
New Nickel-Chromium Iron Withstands Abrasion

A new type of commercial nickel-chromium cast iron, known as Super Manga iron and claimed to possess unusual abrasion-resisting properties, has been developed by the Robins Conveying Belt Co., 15 Park Row, New York. It is intended for use in equipment handling abrasive materials such as coke, ore, stone and the like.

Composition involves a properly adjusted base mixture to which about 4.5 per cent nickel and about 1.5 per cent chromium are added. Structure is martensitic with a refined carbide network. Chilled surface is said to show a brinell hardness of 600-750. Chill depth may be controlled within close limits and a tough, gray back provided, if desired. It may also be sand cast, with a resultant hardness of 475-625. Wear tests are reported to show two to 12 times longer life than plain chilled iron in numerous applications, such as cement mill liners and coal pulverizer hammers.

Making the Most of METHODS AND MATERIALS

ADVERTISING PAGES REMOVED



STEELS containing from 18 to 30 per cent or even higher chromium have been found to possess in the cast and wrought states remarkable resistance to oxidation at elevated temperatures. If temperatures of 1830 degrees Fahr. or higher are to be employed, it is necessary to have a minimum chromium content of 20 per cent. While these steels provide excellent resistance to oxidation, they are not so strong as the metal in which nickel also is incorporated. Although these higher plain chromium steels develop grain growth at extremely high temperatures and also become embrittled if cooled slowly through a comparatively narrow range of temperature below a dull red heat, they nevertheless are the most satisfactory materials for a wide variety of applications, especially where resistance to sulphur-containing gases at high temperatures is required.

$ $ $

Practically all thicknesses of rolled steel can be cut by means of the oxy-acetylene process and with reasonable accuracy. For 2-inch plates the cutting tolerance can be held to plus or minus 1/32 to 1/16 inch and for plates or slabs 24 inches thick, plus or minus 3/16 inch. Nearly all steels used in machine construction can be flame cut without injury to the physical qualities of the metal, but in the higher carbon steels, they are preheated before cutting and normalized after cutting.

$ $ $

AFTER 52 years, an 18-inch double leather belt still is in service in the plant of a furniture manufacturer. This is remarkably long service. Installed in 1881, this belt runs from a 72-inch pulley on a lineshaft to a 48-inch pulley on a countershaft. It was taken from the pulleys this year to dress and repair and the belt maker doing the work said it appeared that it had not been repaired before. Neither could the plant superintendent recall that the belt had ever been taken from the pulleys. The belt was pegged with six rows of wooden pegs its entire length—evidently half a century ago this was supposed to make it a better belt.

$ $ $

Even the sugar industry uses metals at high temperatures. Bone char is a common decolorizer of syrup, and economy demands revivification. High temperature retorting is employed, and the refinery depends on a continuous return of char. One of the refineries has at present more than 1000 retorts containing over 20 per cent chromium, and only a few replacements have been necessary at the end of each operating season.

$ $ $

Careful investigation has demonstrated that carbon, chromium and molybdenum are the most effective elements in increasing the wear resistance of iron and steel. Each contributes inherent hardness, and

molybdenum, because it is both carbide forming and ferrite soluble, serves a still further important purpose. It adds toughness and strength to the carbides and increases both the strength and wear resistance of the ferrite. These facts are corroborated by its use in white, chilled, gray and malleable iron for many different kinds of abrasive service. Molybdenum, furthermore, increases penetration hardness and adds toughness by permitting the use of higher drawing temperatures for equivalent hardness.

$ $ $

In iron and steel plants, foundries and smelters, there are many operations requiring the use of wire rope in the presence of high temperatures. Frequently, corrosive fumes are present as well. In a particular installation in a vertical heat treating furnace, the service of ordinary rope was so uncertain that at times a new rope would become weakened by the high temperatures and would break on the first application of load. Others lasted a week or two. A solution was found by installing 18-8 chrome-nickel corrosion-resisting steel rope. According to the operator, one stainless rope lasted a year.

$ $ $

A MANUFACTURER of breathing apparatus for use in gaseous atmospheres has equipped the face piece on the cannister mask with an arrangement which enables the wearer to speak and be heard distinctly. The advantage is that men working together and both having masks can converse readily, whereas with the old type face piece a man wearing a mask could not make himself understood.

$ $ $

Whiteheart malleable iron, with a structure of pearlite, temper carbon and a small proportion of ferrite has a thermal conductivity of 0.115 calories per square centimeter per second at 100 degrees Cent., and blackheart malleable iron, with a structure of ferrite, temper carbon and a small proportion of pearlite, has a thermal conductivity of 0.150 calories per square centimeter per second at the same temperature.

$ $ $

Steels containing 7 to 9 per cent chromium, especially in conjunction with silicon an aluminum, have long functioned satisfactorily as valves in internal combustion engines. One of the most important of the chromium steels is the type containing 12 to 14 per cent chromium with moderately low carbon. Steels of this class have found large outlet as steam turbine blades, valve stems, and disks used in high-pressure steam lines. At present, a large use in steam boilers is contemplated for seamless tubes containing approximately 12 per cent chromium. It is believed that in the near future steels of this class will be so improved through the addition of other elements as to render them applicable under even more severe conditions of temperature and corrosion.

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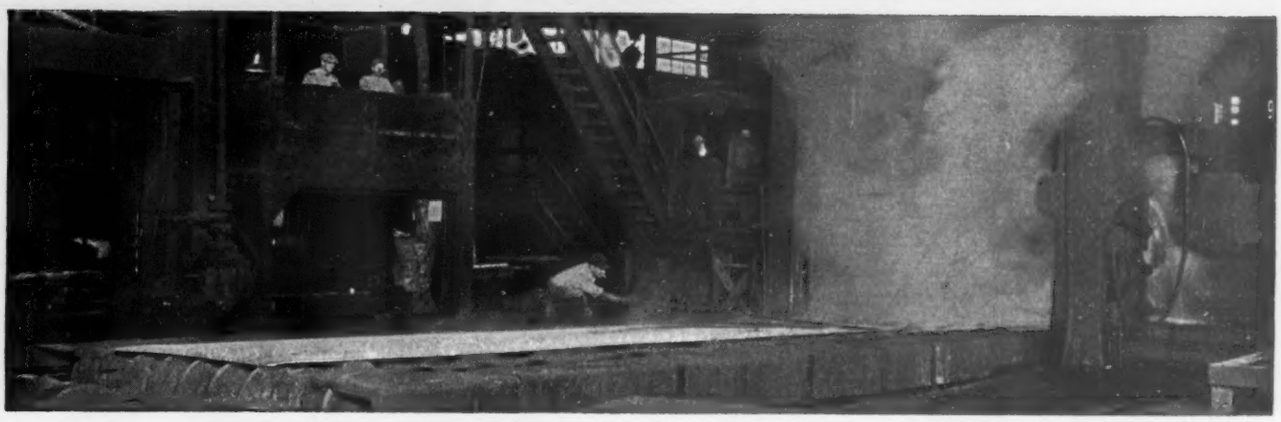


PROGRESS IN STEELMAKING

CONTINUOUS sheet furnaces, which handle 1 ton of product an hour for each 10 feet of furnace length, may be classified as having a good average rating, according to an authority on sheet mill equipment.

CORROSION of idle boilers is allayed by mixing the boiler water with ammonia, according to tests conducted abroad. When the boiler is to be restored to service, the system is flushed out twice with water.

♦ ♦ ♦

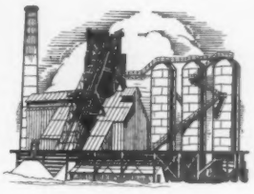
Refractory-lined conveyor beams are used in a recently marketed furnace designed for uniform heating of billets for forging or other semi-finished material for rolling. Scaling and surface decarburizing are minimized by water seals and a system of siphoning which prevent air infiltration into the heating compartment. Movements of the walking beam are interlocked and are controlled automatically. Distribution of heat is controlled by automatic temperature regulators and by the proper location of burners.

♦ ♦ ♦

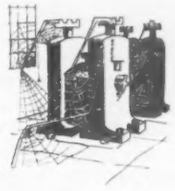
Effect of various differences in the ingot on the tendency of low-carbon unkilled basic open-hearth steel to become brittle on cold working has been disclosed by German metallurgists. This tendency was determined from the position of the temperature-impact value curves for steel in the as-rolled state and after the depth of the rectangular bar had been reduced 10 per cent by cold work, followed by an anneal at 482 degrees Fahr. The open-hearth heats used in the investigation were made with one-third pig iron, two-thirds scrap and no ore; two-thirds pig iron, one-third scrap and ore additions; and, pig iron, no scrap and ore. All heats were deoxidized with ferromanganese, poured into 3¾-ton ingots and analyzed about 0.07 per cent carbon and 0.40 per cent manganese. The tests indicated that the tendency to embrittlement was greater as the proportion of pig iron in the charge increased, as the segregation of the ingot increased and with larger grain structure.

♦ ♦ ♦

Commercial tests of a recently developed free cutting bessemer screw steel disclose improvements in production ranging from 11 to 99 per cent. Reduction in machining time and extension of tool life are claimed.



STEEL wool and long fiber asbestos in combination are used to prevent the escape of dust and gas around the gage rods on blast furnace tops. The sealing material is packed in a tapered cast-steel compartment through which the gage rod operates. Loose chain resting on the sealing material at the top of the compartment produces a constant pressure against the gage rod. The sealing material as well as a slight accumulation of flue dust in the lower part of the seal, form a barrier and prevent the escape of gas and dust. By this arrangement the accumulation of dust on the top platform is lessened, the gage rod hole is not cut away by the action of escaping gas, and the hazard of men becoming gassed while oiling the top rigging or performing other duties on the top of the stack is eliminated.



RUST inhibitors or slushing compounds having a petroleum base offer maximum resistance to oxidation when applied to idle rolling mill machinery. A typical formula includes 20 parts of H-grade rosin, 100 parts petrolatum, 10 parts kerosine. The rosin is melted and mixed with a hot petrolatum, after which the kerosine is added. Adhesiveness of the petrolatum is increased by the rosin. Wax frequently is added to increase the melting point.

♦ ♦ ♦

Barium steel in the form of blooms, billets, sheet bars and rounds is to be manufactured by a recently formed Ohio company. The steel is to be made from stainless scrap by a new process involving the use of a special type electric furnace and the introduction of barium during the melting period.

♦ ♦ ♦

Bright drawn wire allowed to cool before it is paper wrapped retains its finish longer than if prepared for shipment while still warm, according to a wire official.

♦ ♦ ♦

An investigation of tin cans fabricated from ordinary steel and steel containing titanium, discloses that after a storage of 20 months, failure of cans made from ordinary black plate and tinned amounted to 33 per cent, and from titanium treated steel 14 per cent. Another test showed 46 and 18 per cent failure respectively.

SCANNING THE FIELD OF TECHNOLOGY

A Digest of Important Developments Pertaining to the Production, Processing, Application and Performance of Steel

Rubber Coatings

By Leonard Church, in Chemical & Metallurgical Engineering, September, 2½ pp., 3 ills., 1 table.

Corrosion resistance, wear and abrasion resistance, and insulation against electricity, heat, sound or vibration, are all possible through the rubber coating of metallic parts. Recently a process has been developed for applying adherent protective coatings of soft and hard rubber to surfaces of any shape by the anode process. This progress involves the deposition of rubber latex and compounding ingredients by ionic coagulating action extending outward into the latex from the deposition surface. When the coagulating ions are impelled by an impressed electromotive force the process is called anode electrodeposition, but when the coagulating ions are allowed to diffuse from the depositing surface the process is called anode ionic deposition. For best results the surface to be coated usually is first coated with zinc, which has been found to be the best plating surface.

—STEEL, 12-11-33

Welded Structures

By H. M. Priest, in a reprint from August issue of Journal of the American Welding Society, available either from the welding society or the American Institute of Steel Construction, New York; 22 pp., 32 diags.

Comprehensive analysis of the practical design of welded steel structures. Much of the information has been abstracted and compiled from current literature on the subject. Subheadings include: Welding processes; form of welds; qualification tests for welders; inspection; ultimate weld failures; attachment of structural shapes and angles; eccentric connections; general and detail design considerations; welded plate girders, trusses, column bases and column splices; and beam connections.

—STEEL, 12-11-33

Crystalline Structures

By Dr. Herbert J. Gough, in the Edgar Marburg lecture presented in June before the American Society for Testing Materials at Chicago; now available in preprint form from the society, 1315 Spruce street, Philadelphia, for $1.

Crystalline structure is considered in relation to failure of metals—especially by fatigue—by this well-known British scientist. Pointing out that the behavior of metals during industrial forming operations can be correlated wth the crystalline structure and the deformation forces, he discusses the basic problem of failure; methods of preparation of single metallic crystals; and crystal structure. Effects of cold working on single crystals and polycrystalline aggregates, and cold working in relation to crystalline structure also are cited.

—STEEL, 12-11-33

Corrosion in Oil Fields

By Stanley Gill, in a paper presented before the American Petroleum institute in Chicago recently, preprinted, 7 pp., 7 ills.

Presentation of accumulated results of practical experience and scientific investigation in the reduction of corrosion losses in equipment used in the production of oil. The author points out that selection of methods which can be used for the prevention of corrosion depends entirely upon the magnitude of the losses arising from corrosion, and upon cost of the preventive method. In many cases, the cure for corrosion will be found worse than the disease itself, the matter of costs being a primary consideration.

—STEEL, 12-11-33

Ore Grinds

By Arthur J. Weinig, in quarterly of the Colorado School of Mines, Golden, Colo., July, 114 pp., charts, diagrams and tables.

This study is titled, "A Functional Size-Analysis of Ore Grinds," and aims to set forth a method of evaluating the distribution, or frequency, of ore grind products that are too fine to be measured by screens, in effect tying on, by means of mathematical formulas, where screening stops. The mathematical methods of analysis are designed to reveal the characteristics of ore grinds and to serve as a basis for evaluating the efficiency of ore grinding.

—STEEL, 12-11-33

Safety Problems

By C. B. Auel, in Abrasive Industry, December, p. 8, 3 pp., 2 ills., 1 table.

Promotion of safety among machine workers depends upon factors other than the mere installation of mechanical guards on the machines. Minimum labor turnover; good health; contentment; neatness; cleanliness; English language; good lighting; wearing apparel; education; X-ray apparatus; air conditioning apparatus; and photoelectric cells are items which must be given attention in any accident prevention program.

—STEEL, 12-11-33

Stainless Equipment

By C. E. Plummer, in Chemical Industries, November, p. 407, 3½ pp.

Discussion of the most commonly used stainless steels and their properties. General clasification is in three groups—martensitic, ferritic and austenitic. Suitability of various types under each of these groups for use in chemical equipment is studied. Special precautions to be observed in fabricating are noted and common causes of failure of stainless steel equipment are enumerated.

—STEEL, 12-11-33

Oil-Fired Furnaces

By R. H. B. Forster, in a paper presented before the graduates' section of the Institution of Mechanical Engineers (England), Nov. 20.

This paper considers fuels and furnaces for purposes other than steam raising. Properties and methods of atomization of various fuel oils are discussed, as are typical combustion chamber refractories. Advantages of preheating air, either by recuperative or regenerative methods, are mentioned.

—STEEL, 12-11-33

Forgeability

By O. W. Ellis and J. Barbeau, in Metals and Alloys, November, p. 171, 3½ pp., 1 ill., 6 charts.

The authors present results of an investigation into the forgeability of high-speed steel. An equation is developed for estimating the energy required to deform normal samples of high-speed steel of various sizes by relatively small amounts.

—STEEL, 12-11-33

Grinding

By R. L. Dowdell and M. J. Wahll, in Metals and Alloys, November, p. 181, 2 pp., 5 ills.

Apparatus and technique are described for metallographic grinding with paraffin impregnated with abrasives.

—STEEL, 12-11-33

CHIPPING REVOLUTIONIZED

Speed your billets through a BONNOT-LENTZ MECHANICAL BILLET CHIPPER.

This self-contained unit performs with splendid efficiency on all alloy and carbon steels now chipped by air methods.

The more serious the defects—the greater the savings. *Off-heats*—which may not be chipped by hand because of prohibitive costs—can *now* be salvaged on a BONNOT-LENTZ unit *at a huge saving.*

Three years of successful commercial performance have proven both dependability and investment value.

There are no installation delays. All power units are integral with the machine.

Set it in place—connect electrical and air lines—and it is ready to go.

A single operator is required, all controls being within easy reach.

Save Re-melt Losses

Patented in United States and foreign countries

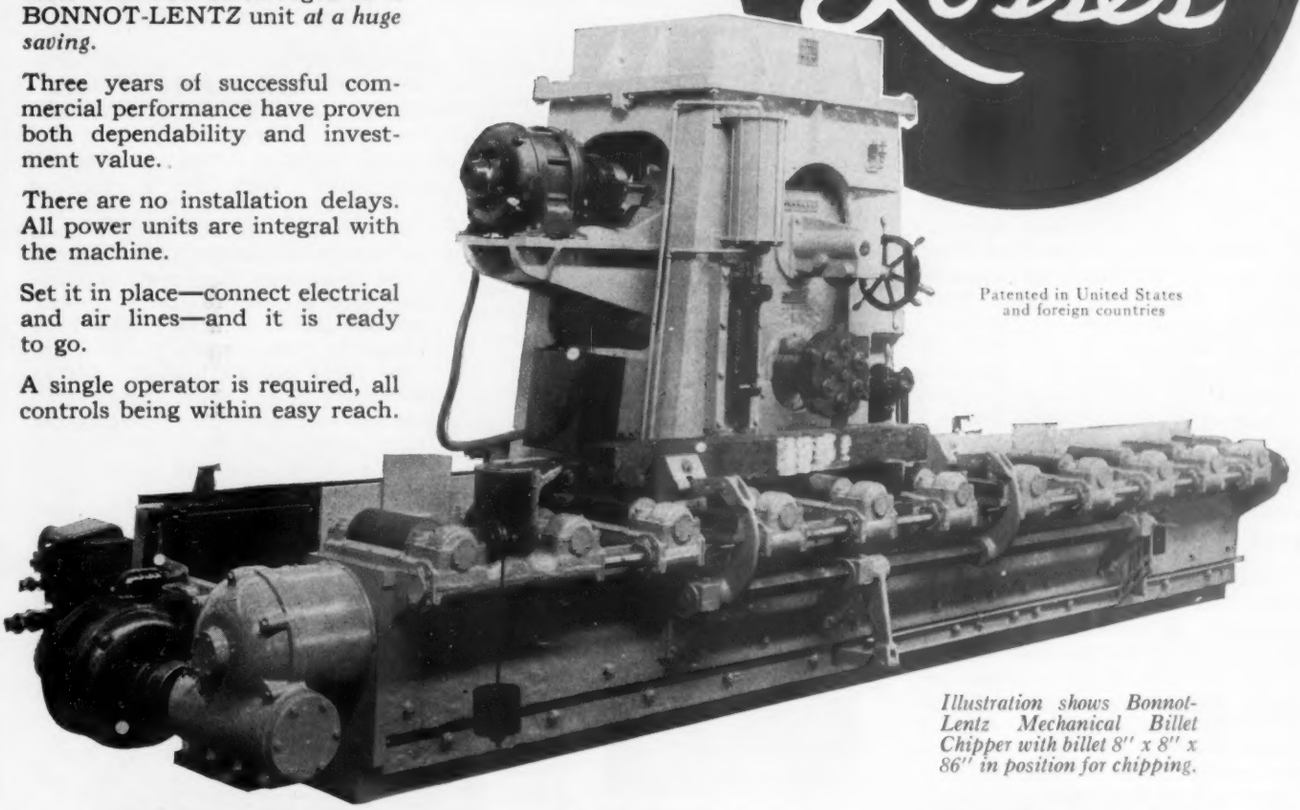


Illustration shows Bonnot-Lentz Mechanical Billet Chipper with billet 8" x 8" x 86" in position for chipping.

POWERFUL • FLEXIBLE • EFFICIENT

The machine is exceedingly flexible, so that seams and defects may be removed in any lateral direction or to any depth with a *minimum amount of waste.*

Demonstration may be arranged. Performance data is available.

Send for an engineer to discuss possible savings in your plant. No obligation.

The Bonnot Company

CANTON, OHIO

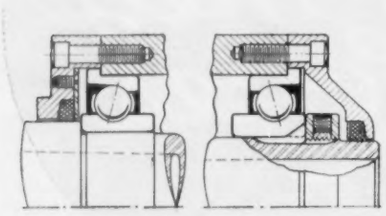
Steel Equipment Division

NEW EQUIPMENT

PRODUCTION FABRICATION
TREATMENT FINISHING

Develops Flanged Precision Spindle Bearings

New Departure Mfg. Co., Bristol, Conn., has developed a line of precision ball bearings flanged for use on spindles. Shoulders are on the bearing instead of in the housings. Thus it is possible to bore housings straight through at one setup. Bearings are separable for quick and easy assembly. Inner rings are extra wide



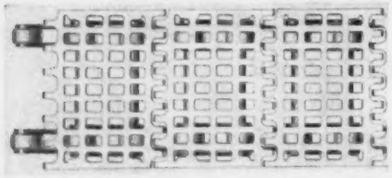
New Departure flanged bearing

to insure firm nondeflecting seating, and are key slotted so that they may be locked to prevent creeping about the shaft. Preloads are applied through the inner rings. These bearings, shown herewith, are supplied in sizes from 30 up to 130 millimeters bore, to precision specifications, and are obtainable in two bore sizes for each standard outside diameter.

◆ ◆ ◆

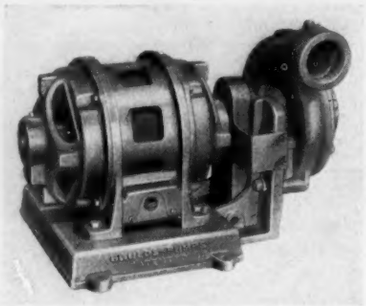
Conveyor Embodies Grating Type Copper Trays

Link-Belt Co., Chicago, recently introduced conveyor chains designed especially for conveying hot bottles or similar products from molding machines to lehrs or normalizing furnaces. As a certain amount of checking occurs when a hot bottle is transferred to a cold conveyor chain, the new chain, shown herewith, employs a grating-type tray made of copper, connected to and supported on or from the inner sides of two strands



Link-Belt copper conveyor chain

of finished steel roller chain. The principle of this design is that as copper is a good conductor of heat there should be considerably less checking of bottles handled.



Goulds motor-centrifugal pump unit

Pump Employs Open Warped Vane Type Impeller

Goulds Pumps Inc., Seneca Falls, N. Y., recently developed a motor-centrifugal pumping unit, shown herewith. A close-coupled type of mounting is employed which permits standard drive motors without special bedplates and brackets. These pumps are built in sizes from ¾ to 4 inches, for capacities up to 1000 gallons per minute. Heads range from 10 to 290 feet. The impeller is the open warped vane type.

◆ ◆ ◆

Self-Tapping Screw Has Standard Thread

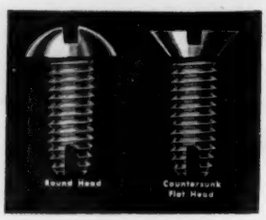
Kellogg Switchboard & Supply Co., 1066 West Adams street, Chicago, is manufacturing a new self-tapping screw designed for use in assembly operations that include fastening of sheet steel, machinery steel, bronze, aluminum, fiber, etc. The Tapster, shown herewith, accomplishes a tapping operation as it is driven into the work. It can be retracted and redriven without injury to itself or the threaded hole. Standard thread, balanced flutes and twin cutting edges are features.

◆ ◆ ◆

Welded Steel Construction Utilized in Presses

Henry & Wright Mfg. Co., Hartford, Conn., recently introduced a line of automatic welded steel presses. These units, shown herewith, are of welded steel construction and embody various automatic features.

Bed, uprights, crown and slide are constructed from special welding quality steel normalized and annealed before machining to release stresses. Crankshafts are made from hammered alloy steel forgings heat treated before finish turning and are mounted in removable hard bronze bushings, crank pin bearings also being bronze bushed. Spring counterbalanced slide, positive clutch, releasing brake, together with single and continuous operating lever, are provided as standard equipment.



Self-tapping screws made by Kellogg Switchboard & Supply Co.

◆

This Henry & Wright press shown at right, has 5-inch crankshaft and is 38 inches between uprights. Roll feeds handle material up to 12½-inch width, feeds having maximum pitch of 8½ inches

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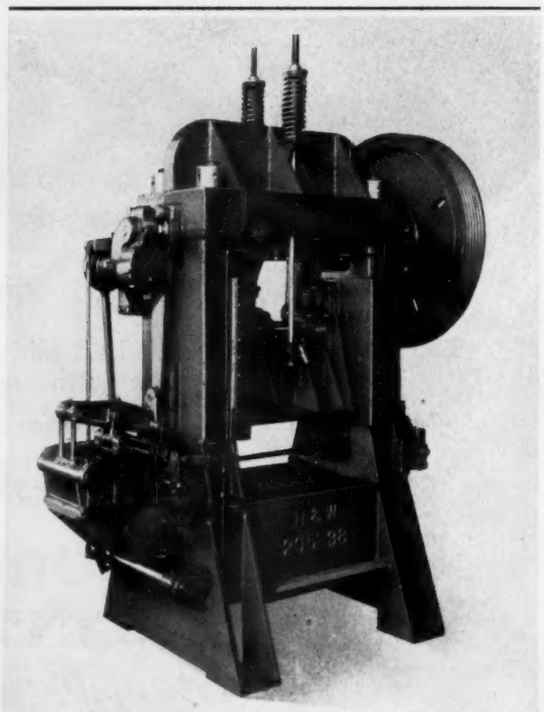


ADVERTISING PAGES REMOVED

Railroad, Plate, Scrap Activity Buoy Market

Steel Rate, After Slight Gain, Heading Into Holidays—Stronger Price Situation Induces Specifying—Pig Iron Shipments Heavy—Foreign Ores Advanced

AFTER rising fractionally last week to just above 29 per cent, practically double the rate of a year ago, steelworks operations were scheduled to ease off moderately this week.

Regardless of inherent strength, suspension of production over the holidays invariably is pronounced. This year, however, the approach is greatly tempered, and barring unforeseen abrupt curtailment between now and Christmas, December output of steel will approximate that of November.

Excepting in tin plate, consumers of which have stocked heavily prior to the sharp advance in the market, there is no sign of a precipitate year-end reaction. Sentiment generally continues strong, and the outlook for the first quarter is the best since the industry plumbed depression depths.

Scrap, which usually is barometric, is encouragingly stronger. "Key" grades in the more important centers are up 50 cents to $1 per ton. The recent Pennsylvania railroad list elicited an increase of $2 per ton on melting steel over a month ago. Dealers are covering their positions, and some are assembling tonnages for steelworks for spring. A sale of 5000 tons of steel has put the market in Philadelphia up $1. STEEL's index of steelworks scrap is up 58 cents to $9.91, first rise since August.

Grade Crossing and Mississippi River Work Loom Large in Future Structural Orders

Although structural steel awards last week, at 10,768 tons, were almost 4000 tons below the weekly average for the year, inquiry is broad and the funds being pushed out by work-creating agencies at Washington are approaching the point where they will mature into steel tonnage. Bids are now in on 12,000 tons for New York Central railroad grade crossing elimination in Syracuse, N. Y. Federal engineers are asking bids, Jan. 3 to Feb. 6, on 6000 tons for Mississippi river locks. Reinforcing concrete market also is being energized by federal projects.

Steel orders are expected to follow the PWA loan of $3,500,000 to the New Haven and $2,000,000 to the Lehigh Valley for reconditioning equipment, first of a series of advances for this purpose. The Pennsylvania opens bids Dec. 20 on additional requirements, including wheels, axles, pipe, etc. It will be March before an appreciable portion of the Pennsylvania's distribution of 100,350 tons of rails is rolled; the Bethlehem company booked 44,350 tons, Carnegie 42,000, Illinois 8000, and Inland 6000.

Erie will place 30,000 tons of rails and 12,000 to 15,000 tons of track fastenings in January, 6000 tons more than its releases for 1933. A federal loan will sanction the Pittsburgh & West Virginia award of 1000 tons of rails to the Carnegie company. Pennsylvania track fastenings have been distributed over many makers.

Kansas City Southern has awarded 100 box cars to its own shops. General American Transportation Corp. has booked 10 tank cars for Mathieson Alkali Works and four for the Union Carbide & Carbon Corp. More than 800 mine cars are now on inquiry. Northern Pacific is expected daily to close on 12 locomotives. November freight car awards totaled 533, against 2 last November. For 11 months the comparison is 2144 for this year and 1689 for last.

More Inquiry Out for Oil Storage Tanks; Bolt and Nut Quotations Are Extended

Broadening inquiry for oil storage tanks makes the outlook for plate mills in this direction the best since 1930. New York Shipbuilding Co. is figuring on one or two tankers for the Standard Vacuum Transportation Co., each requiring 5700 tons of plates, shapes and bars, chiefly plates. The navy is about to distribute 6365 tons of plates, 7255 tons of bars and 2995 tons of shapes.

Automotive releases for steel, principally, sheets and strip, are somewhat broader, but short of the volume expected later this month for January delivery. Appreciably higher specifications for cold-finished bars, wire rods and wire products reflect approaching higher prices. In the East, the desire to conserve cash for the Dec. 31 showing is restraining specifying. Bolt and nut prices have been extended.

Pig iron shipments are at a high level, as existing contracts must be taken out this month.

Steelworks operations last week were: Wheeling 41 per cent, off 10 points; Cleveland 54, up 6; Buffalo 24, off 6; Birmingham 52, up 32; Pittsburgh 24, up 2; Chicago 25½, off 2½; eastern Pennsylvania 18½, up 1½; Youngstown 35, unchanged; New England 81, up 6.

STEEL's iron and steel composite was unchanged last week at $32.42 and its finished steel composite at $51.10.

COMPOSITE MARKET AVERAGES

	Dec. 9	Dec. 2	One Month Ago Nov., 1933	Three Months Ago Sept., 1933	One Year Ago Dec., 1932	Ten Years Ago Dec., 1923
Iron and Steel Composite	$32.42	$32.42	$31.59	$31.30	$28.93	$43.02
Finished Steel Composite	51.10	51.10	49.20	48.52	46.74	67.53
Steelworks Scrap Composite	9.91	9.33	9.64	10.83	16.41	16.00

Iron and Steel Composite:—Pig iron, billets, slabs, sheet bars, wire rods, tin plate, nails, sheets, plates, shapes, bars, and black pipe. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

	Dec. 9, 1933	Nov. 1933	Sept. 1933	Dec. 1932
Finished Material				
Steel bars, Pittsburgh	1.75	1.75	1.60	1.60
Steel bars, Chicago	1.80	1.80	1.70	1.70
Steel bars, Philadelphia	2.04	2.04	1.91	1.91
Iron bars, Chicago	1.60	1.60	1.60	1.65
Shapes, Pittsburgh	1.70	1.70	1.60	1.55
Shapes, Philadelphia	1.90	1.90½	1.81½	1.75
Shapes, Chicago	1.75	1.75	1.65	1.70
Tank plates, Pittsburgh	1.70	1.70	1.60	1.60
Tank plates, Philadelphia	1.88	1.88½	1.79½	1.79½
Tank plates, Chicago	1.75	1.75	1.65	1.70
Sheets, No. 10, hot rolled, Pitts.	1.75	1.75	1.70	1.70
Sheets, No. 24, hot ann., Pitts.	2.25	2.25	2.25	2.10
Sheets, No. 24, galvan., Pitts.	2.85	2.85	2.85	2.85
Sheets, No. 10, blue anneal., Gary	1.85	1.85	1.75	1.80
Sheets, No. 24, hot anneal., Gary	2.35	2.35	2.35	2.20
Sheets, No. 24, galvan., Gary	2.95	2.95	2.95	2.85
Plain wire, Pittsburgh	2.20	2.10	2.10	2.20
Wire nails, Pittsburgh	2.35	2.10	2.10	1.95
Tin plate, per base box, Pitts.	5.25	4.65	4.65	4.25
Semifinished Material				
Sheet bars, open-hearth, Youngs.	26.00	26.00	26.00	26.00
Sheet bars, open-hearth, Pitts.	26.00	26.00	26.00	26.00
Billets, open-hearth, Pittsburgh	26.00	26.00	26.00	26.00
Wire rods, Pittsburgh	36.00	35.00	35.00	37.00

	Dec. 9, 1933	Nov. 1933	Sept. 1933	Dec. 1932
Pig Iron				
Bessemer, del. Pittsburgh	19.26	19.26	19.26	15.76
Basic, valley	17.00	17.00	17.00	14.00
Basic, eastern, del. eastern Pa.	18.76	17.76	17.76	13.75
No. 2 foundry, del. Pittsburgh	18.76	18.76	18.76	15.76
No. 2 foundry, Chicago	17.50	17.50	17.50	15.50
Southern No. 2, Birmingham	13.50	13.50	13.50	11.00
No. 2X, Eastern, del. Phila.	19.63	18.63	18.63	14.26
Malleable, valley	17.50	17.50	17.50	14.50
Malleable, Chicago	17.50	17.50	17.50	15.50
Lake Superior charcoal, del. Chi.	23.54	23.54	23.54	23.04
Gray forge, del. Pittsburgh	18.38	18.38	18.26	15.63
Ferromanganese, del. Pittsburgh	87.24	87.24	87.24	73.24
Scrap				
Heavy melting steel, Pittsburgh	$12.00	11.65	13.00	8.70
Heavy melting steel, eastern Pa.	10.00	9.56	10.50	7.25
Heavy melting steel, Chicago	8.75	8.35	9.95	5.45
No. 1 wrought, eastern Pa.	11.00	10.15	11.00	7.25
No. 1 wrought, Chicago	8.10	8.10	9.25	5.05
Rails for rolling, Chicago	10.25	10.25	11.25	8.25
Coke				
Connellsville, furnace, ovens	3.75	3.75	2.50	1.75
Connellsville, foundry, ovens	4.25	4.25	3.15	2.50

Steel, Iron, Raw Material and Metals Prices

Prices conform to American Iron and Steel institute schedules. Asterisks denote price changes this week

Sheet Steel

HOT ROLLED No. 10
(24 to 48 inches wide)

Pittsburgh, base	1.75c
Gary, base	1.85c
Chicago, del.	1.88c
New York, del.	2.08c
Philadelphia, del.	2.04c
Birmingham, base	1.90c
St. Louis, del.	2.07c

HOT ROLLED ANN. No. 10

Pittsburgh, base	1.90c
Gary, base	2.00c
Chicago, del.	2.03c
Philadelphia, del.	2.19c
New York, del.	2.23c
St. Louis, del.	1.97c
Birmingham, base	2.05c
F.o.b. cars, dock Pacific ports	2.42½c

HOT ROLLED ANN. No. 24

Pittsburgh, base	2.25c
Gary, base	2.35c
Chicago, del.	2.38c
Detroit, del.	2.45c
New York, del.	2.58c
Philadelphia, del.	2.54c
Birmingham, base	2.40c
St. Louis, del.	2.57c
F.o.b. cars, dock, Pacific ports	2.95c

GALVANIZED No. 24

Pittsburgh, base	2.85c
Gary, base	2.95c
Chicago, del.	2.98c
Philadelphia, del.	3.14c
New York, del.	3.18c
Birmingham, base	3.00c
St. Louis, del.	3.17c
San Francisco, f.o.b. cars, dock	3.55c

TIN MILL BLACK No. 28

*Pittsburgh, base	2.65c
*Gary, base	2.75c
*St. Louis, del	2.97c

COLD ROLLED No. 10

Pittsburgh, base	2.30c
Detroit, delivered	2.50c
Gary, base	2.40c
Philadelphia, del.	2.59c
New York, del.	2.63c

COLD ROLLED No. 20

Pittsburgh, base	2.75c
Detroit, del.	1.90c
Gary, base	2.85c
Phildelphia, del.	3.04c
New York, del.	3.08c

ENAMELING SHEETS

Pittsburgh, No. 10	2.45c
Pittsburgh, No. 20	2.90c

Tin and Terne Plate

Per 100-lb. box, Pittsburgh
Gary base, 10 cents higher

Tin plate, coke base, contract	$5.25
Long ternes, No. 24 unassorted	3.25c

Corrosion and Heat Resistant Alloys

Base, Pittsburgh

18% chrome, 8% nickel; sheets, 35c; plates, 31c; bars, 28c.

	A	B	C	D
Bars	17c	18.5c	21c	26c
Plates	20c	21.5c	24c	29c
Sheets	25c	28c	31c	35c
Hot strip	17c	18.5c	21c	26c
Cold Strip	22.5c	24c	27c	35c

Carbon 0.12 and under; no nickel. A has chrome 15% and under. B over 15/18% inc., C over 18/23% inc., D over 23/30%.

Steel Plates

Pittsburgh, base	1.70c
New York, del.	1.98c
Philadelphia, del.	1.88½c
Boston, del.	2.10c
Buffalo, del.	1.93½c
Chicago, base	1.75c
Cleveland, del.	1.88½c
Birmingham, base	1.85c
Coatesville, base	1.80c
Sparrows Pt., base	1.80c
Pacific Coast, f.o.b. cars, dock	2.25c
St. Louis, del.	1.97c

Structural Shapes

Pittsburgh, base	1.70c
Philadelphia, del.	1.90½c
New York, del.	1.95½c
Boston, del.	2.08½c
Bethlehem, base	1.80c
Chicago, base	1.75c
Cleveland, del.	1.88½c
Buffalo, base	1.80c
Birmingham, base	1.85c
Pacific Coast, f.o.b. cars, dock	2.25c

Bars

SOFT STEEL

Pittsburgh, base	1.75c
Chicago, base	1.80c
Birmingham, base	1.90c
Buffalo, base	1.85c
Cleveland, base	1.80c
Detroit, del.	1.90c
Pacific Coast ports, cars, dock, c.i.f.	2.30c
Philadelphia, del.	2.04c
Boston, del.	2.19c
New York, del.	2.08c
Pitts., forg. qual.	1.75c-2.25c

RAIL STEEL
To Manufacturing Trade

Pittsburgh	1.65c
Chicago	1.70c
Cleveland	1.70c
Gary, Ind.	1.70c
Buffalo	1.75c

IRON

Terre Haute, Ind., base 1.60c
Philadelphia, base.. 1.74c
Pittsburgh, refined.. 2.75c-7.50c

REINFORCING
New billet, cut lengths, carlots

Pittsburgh 1.90c
Chicago, Gary, Buffalo, Cleve., Birm., Young... 1.95c
Gulf ports 2.30c
Pacific coast ports 2.45c
Philadelphia, del. 2.19c

Rail steel

Pittsburgh, base 1.75c
Chicago, Buffalo, Cleveland, Birm., Young. 1.80c
Gulf ports 2.15c
Pacific coast ports 2.30c

Wire Products □ □

(Prices on carloads. Mixed carloads up 10c; joint carloads up 20c; less carloads up 30c. 10% dis. on nail extras on straight or mixed carloads to one consignee.)

Base, Pittsburgh-Cleveland
(Per 100-lb. keg)

Standard wire nails $2.35
Cement coated nails 2.35
Galvanized nails 3.85

(Per pound)

Polished staples 3.05c
Galvanized fence staples 3.30c
Barbed wire, galv. 2.85c
Annealed fence wire 2.35c
Galvanized fence wire.... 2.80c
Woven wire fencing (base column, c.l.).....$60.00
Plain wire, 6-9 gage to mfg. trade 2.20c

Anderson, Ind., Chicago up $1; Duluth up $2; Birmingham up $3.

Spring wire 3.20c

Chicago and Waukegan $1 higher, Worcester $2 higher.

Cold-Finished Carbon Bars

(To be advanced Jan. 1)

Base Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,999 lbs..... 1.95c
20,000 to 59,999 lbs..... 1.90c
60,000 to 99,999 lbs..... 1.85c
100,000 lbs. and over 1.82½c

Chicago, Cleveland, Buffalo up 5c; Detroit up 20c; eastern Michigan up 25c.

Shafting □ □ □

(To be advanced Jan. 1)

Turned and ground, Pitts. base

1⅛-inch 3.25c
1 3/16 to 1½-inch..... 2.75c
1 9/16 to 1⅞-inch..... 2.60c
1 11/16 to 2 7/16-inch..... 2.45c
2 1/16 to 6-inch..... 2.30c

Alloy Steel Bars □

Hot rolled

Pittsburgh, Buffalo, Chicago, Massillon, Canton 2.45c
Bethlehem 2.55c

Alloy S.A.E.	Diff.	Alloy S.A.E.	Diff.
2000	0.25	3100	0.55
2100	0.55	3200	1.35
2300	1.50	3300	3.80
2500	2.25	3400	3.20

4100 .15 to .25 Mo. 0.50
4600 .20 to .30 Mo. 1.25-1.75 Ni. 1.05
5100 .80-1.10 Cr. 0.45
5100 Cr. spring .....base
6100 bars 1.20
6100 spring 0.70
Cr., Ni., Van. 1.50
Carbon van. 0.95
9250.....carbon base plus extras

Strip and Hoops □

Hot strip to 23 1/16-in.
Pittsburgh 1.75c
Do., Chicago 1.85c
Do., del. Detroit.. 1.95c
Do., del. Phila..... 2.04c
Do., del. N. Y..... 2.08c
Cooperage hoop, Pittsburgh 1.85c
Do., Chicago 1.95c
Cold-rolled strip, Pitts., Cleve. 2.40c
Worcester 2.60c

Rails, Track Material □

(Gross Ton)

Standard rails, mill $36.37½
Relay rails, Pitts.
20-45 lbs. $26.00
50-60 lbs. $23.00
70-75 lbs. $18.00
80-85 lbs. $24.00
100 lbs. $25.00
Light rails, billet qual., Pitts., Chi. $32.00
Do., reroll. qual.... $31.00
Angle bars, mills... 2.55c
Spikes, R. R., base.. 2.40c
Track bolts, base.... 3.55c
Tie plates, base 1.90c

Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up $5; 16 and 20 lbs., up $1; 12 lbs., up $2; 8 and 10 lbs., up $5. Base railroad spikes 200 kegs or more; base tie plates 20 tons or more; diff. for less.

Bolts and Nuts □ □

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate jobbing or large consuming trade for full case lots, Dec. 1, 1932, lists.

CARRIAGE BOLTS

All sizes, cut thread.....70 off
Rolled thread, ½ x 6 and smaller .....70 off

MACHINE BOLTS

All sizes, cut thread, lag screws, plow bolts, Nos. 1-2-3-7 heads, tap bolts, blank bolts, stud bolts without nuts .....70 off
Tire bolts .....60 off
Stove bolts, 72½-25-10 off in pkgs.; 85 off in bulk, 5000 or more of a size.
Rolled thread machine bolts, ½ x 6 and smaller, 70 off
Step bolts .....66 off
Elevator bolts .....66 off

NUTS

Semifinished .....70 off

HEXAGON CAP SCREWS

Milled .....85 off
Upset 1-in., smaller....85-10 off

SQUARE HEAD SET SCREWS

Upset, 1-in., smaller.....80 off
Upset, larger than 1-in.....80 off
Headless set screws.....75-10 off

Rivets, Wrought Washers

Struc., c.l., Pittsburgh, Cleveland 2.75c
Struc., c.l., Chicago 2.85c
⅞-in. and smaller, Pitts., Chi., Cleve..70 and 10 off
Wrought washers, Pitts., Chi., Phila..6.00-6.25 off

Cut Nails, Piling □

Cut nails, Pitts.; (10% discount on size extras) $2.75
Do. less carloads, 5 kegs or more; no discount on size extras $3.00
Do., less than 5 kegs; no discount on size extras $3.15
Steel piling, Pitts. 2.00c
Steel piling, Chi., Buff.... 2.10c

Pipe and Tubing

Base $200 net ton, except on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Gary, Ind., Lorain, O., to consumers in carloads. Indiana Harbor, Ind., and Evanston, Ill., 2 points less. Chicago delivered 2½ points less. Wrought pipe, Pittsburgh base.

BUTT WELD
Steel

In.	Blk.	Gal.
¼ and ⅜	57	38½
½	62	50½
¾	65½	55½
1—3	67½	58½

Iron

½	31½	15
¾	36½	20½
1—1¼	39½	25½
2	41½	26

LAP WELD
Steel

2	63½	54½
2½—3	66½	57½
3½—6	68½	59½
7 and 8	67½	57½
9 and 10	67	57

Iron

2	37	22½
2½—3½	38	25
4—8	40	28½
9—12	38	24½

LINE PIPE
Steel

⅛-inch, butt weld	50½
¼—⅜, butt weld	56
½, butt weld	61
¾, butt weld	64½
1—3, butt weld	66½
2-inch, lap weld	62½
2½—3, lap weld	65½
3½—6, lap weld	67½
7—8, lap weld	66½

Iron

⅛—1½ inch, black and galv. take 4 pts. over; 2½—6 inch 2 pts. over discounts for same sizes, standard pipe list. 8—12 inch no extra.

BOILER TUBES

C. L. Discounts, f.o.b. Pitts.

Lap Weld Steel		*Charcoal Iron*	
2—2¼	33	1¾	8
2½—2¾	40	2—2¼	13
3	47	2½—2¾	16
3¼—3¾	50	3	17
4	52	3¾—3½	18
4½—6	42	4	20
1½	1	4½	21

In lots of a carload or more, above discounts subject to preferential of two 5% discounts on steel and 10% on charcoal iron.

Lapwelded steel: Under 10,000 lbs., 6 pts. under base and one 5%; on 10,000 lbs. to carload, 4 pts. under base and two 5%. Quantity discounts same as for hot-rolled. Charcoal iron: Under 10,000 lbs., 2 pts. under base; on 10,000 lbs. to carload, base and one 5%.

SEAMLESS BOILER TUBES

Cold Drawn

2—2¼	27	3¼—3½	41
2½—2¾	34	4	46
3	38	4½, 5, 6	43

(On 1—1¾-inch sizes mechanical tubing dis. apply.)

Hot Rolled

2—2¼	33	3¼—3½	47
2½—2¾	40	4	49
3	44	4½, 5, 6	42

Quantity discounts: Under 10,000 lbs., 10 pts. and 5%; 10,000 to 24,999 lbs., 6 pts. and 5%; 25,000 lbs. to carload, 2 pts. and 5 and 5%; carload and over, base discount and 5 and 5%. No extra for lengths 24 ft. and under.

Seamless Tubing □

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs..... 32%
15,00 ft. or 22,500 lbs. 70%

Cast Iron Water Pipe □

Class B Pipe—Per Net Ton

6-in. & over, Birm. $36.00-37.00
4-in., Birm. 39.00-40.00
4-in., Chicago 47.00-48.00
6 to 24 in., Chicago 44.00-45.00
6-in. & over, east. fdy. 40.00
Do., 4-in. 43.00

Class A pipe $3 over Class B.
Stand, fitgs., Birm. base..$90.00

Six to 24-inch, fittings, base; over 24-inch plus $20; 4-inch, plus $10; 3-inch, plus $20; gas pipe fittings, 5 higher.

Semifinished Steel □

Prices Per Gross Ton

BILLETS AND BLOOMS
4 x 4-inch base

Pitts., Chi., Cleve., open-hth. & bess. $26.00
Philadelphia 31.30
Forging, Pitts., Chi. 31.00

SHEET BARS

Pitts., Cleve., Yong. 26.00
Chicago 26.00
Canton, O. 26.00

SLABS

Pitts., Cleve., Yong. 26.00

WIRE RODS

Pitts., Cleveland.... 36.00
Chicago 36.00

SKELP

All grades, Pitts. and Chicago 1.60c

Coke □ □ □

Price Per Net Ton

BEEHIVE OVENS

Connellsville fur..... $3.75
Connellsville fdry.... 4.25
Connell. prem. fdry. 5.25
New River fdry..... 6.00
Wise county fdry... 4.25- 5.00
Wise county fur..... 3.50- 4.25

BY-PRODUCT FOUNDRY

Newark, N. J., del. 8.71- 9.31
Chi. ov., outside del. 8.50
Chicago, del. 9.25
New England, del.. 10.50
St. Louis, del. 8.75
Birmingham, ovens 5.00
Indianapolis, del.... 8.75
Ashland, Ky., Connells. basis 5.50
Portsmouth, ovens, Connell. basis..... 5.50
Buffalo, ovens..... 7.50- 8.00
Detroit, ovens 8.00
Philadelphia, del..... 9.00

Coke By-Products □

Per gallon, producers' plants.

Tank lots

	Spot
Pure benzol	$0.22
90 per cent benzol..	0.22
Toluol	0.30
Solvent naphtha.....	0.26
Commercial xylol...	0.26

Per lb. f.o.b. New York

Phenol (200 lb. drums).. 0.163c
Do., (100 lb.) 0.173c

Per lb., producers' plants

Naphthalene flakes and balls 6.00- 7.25
Per 100 lb. Atlantic seaboard
Sulphate of ammonia $1.25

Pig Iron

Delivered prices do not include switching charges except as noted. No. 2 foundry iron is 1.75-2.25 silicon; 25-cent differentials apply for each 0.25 silicon above 2.25

Gross Tons

	No. 2 Fdry.	Malleable	Basic	Bessemer
Basing Points:				
Bethlehem, Pa.	$18.50	$19.00	$18.00	$19.50
Birdsboro, Pa.	18.50	19.00	18.00	19.50
Swedeland, Pa.	18.50	19.00	18.00	19.50
Sparrows Point, Md.	18.50	.....	18.00	.....
From Swedeland, Pa., del. to Phila.	19.26	19.76	18.76	.....
From Bethlehem, del. to Brooklyn	20.77	21.27	.....	.....
From Bethlehem, del. to Newark, N. J.	19.99	20.39	.....	.....
Basing Point:				
Everett, Mass.	18.50	19.00	18.00	19.50
From Everett, del. to Boston	19.00	19.50	18.50	20.00
Basing Point:				
Buffalo	17.50	18.00	16.50	18.50
From Buffalo, del. to Boston	19.00	19.50	18.50	20.00
Basing Points:				
Neville Island, Pa.	18.00	18.00	17.50	18.50
Sharpsville, Pa.	17.50	17.50	17.00	18.00
Youngstown, O.	17.50	17.50	17.00	18.00
From Neville Island, Pa., del. to Pittsburgh district	(Neville Island base, plus 63c to $1.13 switching charges)			
Basing Points:				
Erie, Pa.	17.50	18.00	17.00	18.50
Cleveland	17.50	17.50	17.00	18.00
Toledo, O.	17.50	17.50	17.00	18.00
Detroit	17.50	17.50	17.00	18.00
From Detroit, del. to Saginaw, Mich.	19.60	19.60	19.10	20.10
From Cleveland, del. to Akron, Canton, O.	18.76	18.76	18.26	19.26
From Toledo, del. to Mansfield, O.	19.26	19.26	18.76	19.76
Basing Point:				
Hamilton, O.	17.50	17.50	17.00	18.00
From Hamilton, del. to Cincinnati	18.51	18.51	18.01	19.01
Do., del. to Indianapolis	19.77	19.77	19.27	20.27
Basing Points:				
Duluth	18.00	18.00	.....	18.50
Chicago	17.50	17.50	17.00	18.00
Granite City, Ill.	17.50	18.00	17.00	.....
From Duluth, del. to St. Paul	19.94	19.94	.....	20.44
From Chicago, del. to Milwaukee	18.50	18.50	18.00	19.00
From Chicago, Toledo or Detroit, del. to Muskegon, Mich.	20.40	20.40	19.90	20.90
From Granite City, del. to St. Louis	(Granite City base, plus 50-cent switching charge)			
Basing Point:				
Birmingham, Ala.	13.50	.....	12.50	.....
From Birmingham, del. to:				
Boston	18.62	.....	18.12	.....
Newark, N. J.	19.58	.....	.....	.....
Brooklyn, N. Y.	20.39	.....	.....	.....
Baltimore	19.02	.....	18.52	.....
Philadelphia	18.88	.....	18.38	.....
Cleveland	19.64	.....	18.64	.....
Cincinnati	18.23	.....	17.11	.....
Chicago	18.16	.....	19.14	.....
St. Louis	17.62	.....	17.50	.....
Basing Point:				
Provo, Utah	16.50	.....	.....	.....

LOW PHOS.

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.—$23.00. Basing point: Johnson City, Tenn.—.....

Philadelphia, standard and copper bearing 24.13

GRAY FORGE		CHARCOAL	
Valley furnace	17.25	Lake Superior fur.	20.50
Pitts. dist. fur.	17.75	Do., del. Chicago	23.54

SILVERY

Jackson County, O., base; 6%—$22.25; 7—$23.25; 8—$24.25; 9—$25.25; 10—$26.25; 11—$27.75.

BESSEMER FERROSILICON

Jackson County, O., base: 10%—$27.25; 11—$28.75; 12—$30.25; 13—$31.75; 14—$33.25; 15—$34.75; 16—$36.25.

Iron Ore □ □

LAKE SUPERIOR ORE

Gross ton, 51½%, Lower Lake Ports

Old range bess.	$4.30
Mesabi bessemer	4.65
Old range nonbess.	4.65
Mesabi nonbess.	4.50
High phosphorus	4.40

EASTERN LOCAL ORES

Cents, unit, del. E. Pa.

Foundry and basic, 56-63%, con. (nom.)	8.00- 9.00
Cop.-free low phos. 58-65% (nom.)	10.00-10.50

FOREIGN ORE

Cents per unit, f.a.s. Atlantic ports (nom.)

*Foreign manganiferous ore, 45-55% iron, 6-10% man.	10.00
*No. Afr. low phos.	9.50
*Swedish basic, 65%	9.00
*Swedish low phos.	9.50
*Spanish So. Afr. basic, 50 to 60%	9.00
Tungsten, spot, sh. ton unit, duty pd.	$14.00-14.25
N. F. fdy., 55%	7.00
*Chrome ore, 48% gross ton, c.i.f.	$18.00

Manganese Ore □

(Nominal)

Prices, not including duty, cents per unit, cargo lots.

Caucasian, 52-55%	22.00
So. African, 52%	21.00-22.00
So. Afr., 49-51%	20.00-21.00
Indian, 48-50%	nominal

Refractories □ □

FIRE CLAY BRICK

per 1000 f.o.b. Works

First Quality

Pa., Ohio, Ill., Ky., Md., Ga., Mo.	$45.00
Alabama	48.00

Second Quality

Pa., Ohio, Ill., Ky., Md., Mo., Ga., Ala.	40.00

MALLEABLE BUNG BRICK

All bases	50.00

SILICA BRICK

Pennsylvania	$45.00
Joliet, E. Chicago	54.00
Birmingham, Ala.	55.00

MAGNESITE BRICK

Per Net Ton, 9 x 4½ x 2½

Burned	$65.00
Unburned	55.00

CHROME BRICK

Per Net Ton

F.o.b. ship. point	$45.00

MAGNESITE

Dead burned grain, Chester, Pa., Baltimore bases, net	40.00
Domes, Chewelah, Wash., base	22.00

Fluorspar □ □

85 and 5 per cent grade

Washed gravel, duty paid, tide, gross ton	$21.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads	$14.75-15.00

Ferroalloys □ □

(In dollars, except Ferrochrome)

Ferromanganese, 78-82% tidewater, duty pd.	82.00
del. Pitts.	87.24
Spiegeleisen, 19-20%, dom., fur., spot†	27.00
Ferrosilicon, 50%, freight all., c. l.	74.50
Do., less carload	82.50
Do, 75 per cent	120-130.00
Spot, $5 a ton higher.	
Silicomang., 2½ carb.	85.00
2% carbon	90.00
1% carbon	100.00
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. con. del.	9.50
Do, spot del.	10.00
Ferrotungsten, stand., lb. cont.	1.16- 1.25
Ferrovanadium, 35 to 40%, lb. cont., on analysis	2.60- 2.80
Ferrotitanium, c. l., prod. plant, frt. allow., net ton	137.50
Spot, 1 ton., frt., all., lb	7.00
Do, under 1 ton	7.50
Ferrophosphorus, per ton, c. l. 17-19%, Rockdale, Tenn., basis; 18%, $2 unitage	50.00
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $2.75 unitage	65.00
Ferromolybdenum, stand, 50-60%, lb.	0.95
Molybdate, lb. cont.	0.80

†Carloads. Quan. diff. apply.

Nonferrous Mill Products

F.o.b. mill base, cents per lb., except as specified. Copper, brass products based on 9.00c, Con., copper

Sheets	
Yellow brass (high)	14.75
Copper, hot rolled	17.12½
Lead, cut, to jobbers	8.00
Zinc, 100-lb. base	9.00
Tubes and Pipes	
High yellow brass	16.37½
Seamless copper	16.62½
Rods	
High yellow brass	12.25
Copper	13.87½
Anodes	
Copper, untrimmed	14.50
Wire	
Yellow brass (high)	14.75

Old Metals □ □

Deal, buying prices, cents lb.

No. 1 Composition Red Brass	
*New York	4.25- 4.50
Chicago	4.00- 4.25
Cleveland	4.50- 5.00
St. Louis	3.50- 3.75
Heavy Copper and Wire	
*New York	5.75- 6.00
Chicago, No. 1	5.50- 5.75
Cleveland	5.00- 5.50
St. Louis	5.25
Composition Brass Borings	
New York	4.12½-4.37½
Light Copper	
*New York	5.00- 5.25
Chicago	4.25- 4.50
Cleveland	4.50- 5.00
St. Louis	4.25
Light Brass	
Chicago	2.50- 2.75
Cleveland	2.50- 3.00
Lead	
*New York	3.00- 3.25
*Cleveland	2.75- 3.00
*Chicago	2.87½-3.12½
St. Louis	2.50- 2.75
Zinc	
New York	2.25- 2.50
Cleveland	2.25- 2.50
Chicago	2.00- 2.25
St. Louis	2.25- 2.50
Aluminum	
*Clips, soft, Cleve.	12.00-12.50
*Borings, Cleve.	5.00- 6.00
*Mixed, cast, Cleve.	7.75- 8.25
Mixed, cast, St. L.	7.00- 7.50

Secondary Metals □

Brass ingot, 85-5-5-5	8.25
Remelt Al., No. 12	12.00-12.50

Iron and Steel Scrap Prices

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL

Birmingham	8.00- 9.00
Boston, dealers	5.00- 5.25
Buffalo, No. 1	9.25-10.00
Buffalo, No. 2	8.00- 8.50
Chicago	8.50- 9.00
Cleveland, No. 1	9.00- 9.50
Cleveland, No. 2	8.50- 9.00
Detroit, No. 1	7.00- 7.50
Detroit, No. 2	6.25- 6.75
Eastern Pa.	10.00
Eastern Pa., No. 2	8.00- 8.50
Federal, Ill.	7.50- 8.00
Granite City, Ill.	8.00- 8.50
N. Y., deal. R. R.	7.50
N. Y., deal. No. 2	6.50
Pittsburgh, No. 1	11.75-12.25
St. Louis, No. 1 del.	9.00- 9.50
Valleys, No. 1	11.50-12.00

COMPRESSED SHEETS

Buffalo, dealers	8.00- 8.50
Chicago, factory	7.00- 7.50
Cleveland	8.25- 8.75
Detroit	7.00- 7.50
E. Pa., new mat	9.00-19.00
Pittsburgh	11.75-12.25
Valleys	11.00-11.50

BUNDLED SHEETS

Buffalo	5.50- 6.00
Cincinnati, del.	5.50- 6.00
Cleveland	6.25- 6.75
Pittsburgh	10.75-11.25
St. Louis	5.00- 5.50

SHEET CLIPPINGS LOOSE

Chicago	4.00- 4.50
Cincinnati	4.50- 5.00
Detroit	5.00- 5.50
St. Louis	4.50- 5.00

STEEL RAILS, SHORT

Birmingham	10.00-11.00
Boston, dealers	5.00- 5.25
Buffalo	12.00-12.50
Chicago (3 ft.)	10.00-10.50
Chicago (2 ft.)	10.50-11.00
Cincinnati, del.	11.00-11.50
Detroit	8.50- 9.00
Pitts., (open-hearth, 3 ft. and less)	13.50-14.00
St. Louis	11.50-12.00

STOVE PLATE

Birmingham	7.50- 8.50
Boston, dealers	4.50- 4.75
Buffalo	8.50- 9.00
Chicago, net	6.00- 6.50
Cincinnati, dealers	6.00- 6.50
Detroit, net	4.50- 5.00
Eastern Pa.	7.50- 8.00
N. Y., deal., fdry.	5.00- 5.50
St. Louis	6.50- 7.00

COUPLERS, SPRINGS

Buffalo	11.50-12.00
Chicago, springs	10.00-10.50
Eastern Pa.	13.00
Pittsburgh	13.50-14.00
St. Louis	10.00-10.50

ANGLE BARS—STEEL

Chicago	9.50-10.00
St. Louis	9.50-10.00

LOW PHOSPHORUS

Buffalo, billets and bloom crops	11.50-12.50
Cleveland bil. and bloom crops	12.50-13.50
Eastern Pa. crops	14.00-14.50
Pittsburgh billet bloom crops	13.50-14.00
Pittsburgh, sheet bar crops	13.50-14.00

FROGS, SWITCHES

Chicago	8.50- 9.00
St. Louis	9.00- 9.50

SHOVELING STEEL

Chicago	8.50- 9.00
St. Louis	7.75- 8.25

RAILROAD WROUGHT

Birmingham	7.00- 8.00
Boston, dealers	2.00- 2.50
Buffalo, No. 1	7.00- 8.00
Buffalo, No. 2	9.50-10.00
Chicago, No. 1, net	7.00- 7.50
Chicago, No. 2	8.50- 9.00
Cincinnati, No. 2	8.00- 8.50
Eastern Pa.	11.00
N. Y., No. 1 deal.	7.00- 7.50
Pittsburgh, No. 1	11.75-12.25
St. Louis, No. 1	6.00- 6.50
St. Louis, No. 2	8.00- 8.50

SPECIFICATION PIPE

Boston	4.00- 4.50
Eastern Pa.	9.50
New York, dealers	4.75- 5.25

BUSHELING

Buffalo, No. 1	8.00- 8.50
Chicago, No. 1	7.00- 7.50
Cinci., No. 1 deal.	5.75- 6.25
Cincinnati, No. 2	2.50- 3.00
Cleveland, No. 2	7.00- 7.25
Detroit, No. 1 new	6.25- 6.75
St. Louis, No. 1	6.00- 6.50
Valleys, new No. 1	10.50-11.00

MACHINE TURNINGS

Birmingham	3.50- 4.50
Boston, dealers	2.00
Buffalo	6.25- 6.50
Chicago	5.00- 5.50
Cincinnati, dealers	4.50- 5.00
Cleveland	7.00- 7.50
Detroit	5.50- 6.00
Eastern Pa.	6.00- 6.50
New York, dealers	2.50- 3.00
Pittsburgh	8.00- 8.50
St. Louis	4.25- 4.75
Valleys	7.00- 7.50

BORINGS AND TURNINGS
For Blast Furnace Use

Boston, dealers	2.00
Buffalo	6.25- 6.50
Cincinnati, dealers	4.50- 5.00
Cleveland	7.00- 7.50
Detroit	5.50- 6.00
Eastern Pa.	5.00- 5.50
New York, dealers	2.00- 2.50
Pittsburgh	7.50- 8.00

CAST IRON BORINGS

Birming., plain	3.50- 4.50
Boston, chemical	8.50- 9.00
Boston, dealers	3.25- 3.50
Buffalo	6.25- 6.50
Chicago	5.25- 5.75
Cincinnati, dealers	4.50- 5.00
Cleveland	7.00- 7.50
Detroit	5.50- 6.00
E. Pa., chemical	12.00-15.00
New York, dealers	3.00
Pittsburgh	7.50- 8.00
St. Louis	4.00- 4.50

PIPE AND FLUES

Cincinnati, dealers	4.00- 4.50

RAILROAD GRATE BARS

Buffalo	5.00- 5.50
Chicago, net	6.00- 6.50
Cincinnati	4.75- 5.25
Eastern Pa.	7.50- 8.00
New York, dealers	4.25- 4.50
St. Louis	5.50- 6.00

FORGE FLASHINGS

Boston, dealers	3.75- 4.00
Buffalo	8.00- 8.50
Cleve., over 10-in.	8.50- 9.00
Detroit	5.50- 6.00

FORGE SCRAP

Boston, dealers	3.75- 4.00
Chicago, heavy	9.50-10.00
Eastern Pa.	10.00-10.50

ARCH BARS, TRANSOMS

Chicago, net	6.50- 7.00
St. Louis	9.00- 9.50

AXLE TURNINGS

Boston, dealers	3.50- 3.75
Buffalo	7.50- 8.00
Chicago, elec. fur.	7.00- 7.50
Cleveland	9.00- 9.50
Eastern Pa.	9.00-10.00
St. Louis	5.00- 5.50

STEEL CAR AXLES

Birmingham	9.00-10.50
Boston, ship. point.	8.00- 8.50
Buffalo	10.00-11.00
Chicago, net	10.00-10.50
Eastern Pa.	14.00
St. Louis	11.00-11.50

SHAFTING

Boston, ship. point.	8.25- 8.50
Eastern Pa.	14.00-14.50
New York, dealers	9.50-10.00
St. Louis	9.00- 9.50

CAR WHEELS

Birmingham, iron	7.00- 8.00
Boston, iron deal.	6.00- 6.50
Buffalo, iron	8.00- 9.00
Buffalo, steel	10.50-11.00
Chicago, iron	9.50-10.00
Chi., rolled steel	10.00-10.50
Cincinnati, iron	8.00- 8.50
E. Pa., iron	10.25-11.00
E. Pa., steel	12.00-13.00
Pittsburgh, iron	10.50-11.00
Pittsburgh, steel	13.50-14.00
St. Louis, iron	8.00- 8.50
St. Louis, steel	9.50-10.00

NO. 1 CAST SCRAP

Birmingham	8.50- 9.00
Boston, No. 2	5.00- 5.50
Boston, Tex. con.	10.25-10.50
Buffalo, cupola	9.50-10.00
Buffalo, mach.	10.00-10.50
Chicago, agri. net	7.00- 7.50
Chi., mach. net	7.75- 8.25
Chi., railroad net	7.25- 7.75
Cinci., mach. cup	8.00- 8.50
Cleveland, cupola	8.50- 9.00
Detroit, net	7.00 7.50
Eastern Pa., cupola	11.00-11.50
N. Y., cup. deal.	6.00- 6.50
N. Y., del. local foundries	9.00- 9.50
Pittsburgh, cupola	11.50-12.00
San Francisco, del.	13.50-14.00
Seattle	4.50- 6.50
St. Louis, No. 1	8.00- 8.50
St. L., No. 1 mach.	8.50- 9.00

HEAVY CAST

Boston, del.	5.00- 5.50
Buffalo, break	7.00- 7.50
Cleveland, break	6.75- 7.00
Detroit, break	5.00- 5.50
Detroit, auto net	8.00- 8.50
Eastern Pa.	10.00
N. Y., No. 1, deal.	6.50- 7.00
N. Y., break. deal.	5.50- 6.00
Pittsburgh	10.50-11.00

MALLEABLE

Boston, consum.	12.00-12.25
Buffalo	10.00-11.00
Chicago, R. R.	9.00- 9.50
Cinci., agri. del.	8.00- 8.50
Cinci., R. R. del.	8.50- 9.00
Cleveland, rail	11.00-11.50
Detroit, auto	6.50- 7.00
St. Louis, R. R.	8.50- 9.00
Eastern Pa., R. R.	12.00-13.00

RAILS FOR ROLLING
5 feet and over

Birmingham	9.50-10.00
Boston, dealers	7.00- 7.25
Buffalo	9.00- 9.50
Chicago	10.00-10.50
Eastern Pa.	12.50
New York, dealer	6.50- 7.00
St. Louis	10.00-10.50

LOCOMOTIVE TIRES

Chicago (cut)	9.50-10.00
St. L., No. 1	8.00- 8.50

LOW PHOS. PUNCHINGS

Buffalo	11.00-11.50
Chicago	10.00-10.50
Eastern Pa.	12.50-13.50
Pittsburgh	13.50-14.00

Nonferrous Metal Prices of the Week

Spot unless otherwise specified. Cents per pound

	Copper: Electro., del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin New York: Spot	Straits Tin New York: Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 98-99%	Antimony Spot, N. Y.	Ingot Nickel
Dec. 2	8.00	8.37½	7.75	53.50	54.25	4.05	3.95	4.50	*22.90	7.25	35.00
Dec. 4	8.00	8.12½	7.75	53.00	53.75	4.15	4.05	4.50	*22.90	7.25	35.00
Dec. 5	8.00	8.12½	7.75	53.50	54.25	4.15	4.05	4.50	*22.90	7.25	35.00
Dec. 6	8.00	8.12½	7.75	52.75	53.35	4.15	4.05	4.50	*22.90	7.25	35.00
Dec. 7	8.00	8.12½	7.75	52.60	53.35	4.15	4.05	4.50	*22.90	7.25	35.00
Dec. 8	8.00	8.12½	7.75	53.30	53.90	4.15	4.05	4.50	*22.90	7.25	35.00

*Nominal quotation. Market range 19.90c to 22.90c.

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS	□
Baltimore *	2.60c
Boston††	2.90c
Buffalo	2.95c
Chattanooga	3.05c
Chicago	2.90c
Cincinnati	3.10c
Cleveland	2.90c
Detroit	2.98½c
Houston	2.40c
Los Angeles	3.30c
New Orleans	3.00c
New York‡(d)	3.17c
Pittsburgh	2.85c
Philadelphia*	2.75c
Seattle	3.40c
St. Louis	3.14c
St. Paul	3.00c
Tulsa	3.25c

IRON BARS	□
Portland	3.40c
San Fran.	3.55c
Baltimore	2.35c-3.00c
Baltimore*	2.60c
Chattanooga	3.05c
Chicago	2.75c
Cincinnati	3.10c
Detroit	2.98½c
New York‡(d)	3.10c
Philadelphia*	2.75c
St. Louis	3.14c
Tulsa	3.25c

REINFORC. BARS	□
Boston	2.75c-3.25c
Buffalo	1.95c
Chattanooga	3.05c
Chicago	1.95c-2.10c
Cincinnati	3.10c
Cleveland	2.22½c
Houston	3.00c
Los Ang. cl.	3.00c
New Orleans	3.00c
New York	3.17c
Philadelphia	2.62½c
Pitts., plain	3.00c
Pitts., twisted sqs.	3.12½c
Seattle	3.50c
St. Louis	3.29c
Tulsa	3.25c
Young.	2.30c-2.60c

SHAPES	□
Baltimore*	2.60c
Boston††	3.07c
Buffalo	3.20c
Chattanooga	3.30c
Chicago	3.10c
Cincinnati	3.30c
Cleveland	3.21c
Detroit	3.30c
Houston	2.65c
Los Ang.	3.30c
New Orleans	3.50c
New York(d)	3.27c
Philadelphia*	2.75c
Pittsburgh	3.05c
Portland	3.40c
San Fran.	3.55c
Seattle	3.40c
St. Louis	3.34c
St. Paul	3.25c
Tulsa	3.50c

PLATES	□
Baltimore*	2.60c
Boston††	3.08c
Buffalo	3.20c
Chattanooga	3.30c
Chicago	3.10c
Cincinnati	3.30c
Cleveland, ¼ in. and thicker	3.21c
Cleve., ⅜-in.	3.20c
Detroit	3.30c
Det., ⅜-in.	3.10c
Houston	3.00c
Los Angeles	3.30c
New Orleans	3.50c
New York(d)	3.30c
Philadelphia*	2.75c
Phila. floor	4.35c
Pittsburgh	3.05c
Portland	3.40c
San Fran.	3.50c
Seattle	3.40c
St. Louis	3.34c
St. Paul	3.25c
Tulsa	3.50c

NO. 10 BLUE	□
Baltimore*	2.75c
Boston††	2.90c
Buffalo	3.10c
Chattanooga	3.50c
Chicago	2.95c
Cincinnati	3.10c
Cleveland	3.01c
Det., 8-10 ga.	3.03½c
Houston	3.35c
Los Ang.	3.45c
New Orleans	3.50c
New York	3.17c
Portland	3.65c
Philadelphia*	2.95c
Pittsburgh	2.85c
San Fran.	3.75c
Seattle	3.65c
St. Louis	3.19c-3.36c
St. Paul	3.45c
Tulsa	3.70c

NO. 24 BLACK	□
Baltimore*†	3.50c
Boston††	3.75c
Buffalo	3.25c
Chattanooga	4.00c
Chicago	3.70c
Cincinnati	3.85c
Cleveland	3.76c
Detroit	3.78½c
Los Angeles	4.05c
New York	3.65c
Philadelphia*†	3.40c
Pittsburgh	3.35c
Portland	4.25c
San Fran.	4.25c
Seattle	4.25c
St. Louis	3.94c
St. Paul	3.695c
Tulsa	4.75c

NO. 24 GAL. SHEETS	□
Baltimore*†	3.75c
Buffalo	4.00c
Boston	4.60c
Chattanooga	4.25c
Chicago	4.20c-4.30c
Cincinnati	4.45c
Cleveland	4.36c
Detroit	4.45c
Houston	3.57c
Los Angeles	4.65c
New Orleans	4.35c
New York	4.25c
Pitts.**	3.90c-4.20c
Portland	4.85c
San Fran.	4.85c
Seattle	4.85c
St. Louis	4.54c
St. Paul	4.19c
Tulsa	5.10c
Phila.*†	4.00c

BANDS	□
Baltimore	2.90c
Boston††	3.15c
Buffalo	3.30c
Chattanooga	3.25c
Chicago	3.20c
Cincinnati	3.35c
Cleveland	3.26c
Detroit, ⅞-in. and lighter	3.28½c
Houston	2.85c
Los Angeles	3.80c
New Orleans	3.20c
New York(d)	3.42c
Philadelphia	3.05c
Pittsburgh	3.10c
Portland	3.90c
San Fran.	3.15c
Seattle	3.90c
St. Paul	3.20c
Tulsa	3.45c
St. Louis	3.44c

HOOPS	□
Baltimore	2.80c
Boston	4.15c
Buffalo	3.55c
Chicago	3.20c
Cincinnati	3.35c
Det., No. 14 and lighter	3.28½c
New York	3.42c
Philadelphia	3.30c
Pittsburgh	3.75c
Seattle	5.40c
St. Paul	3.75c

COLD FIN. STEEL	□
Baltimore(c)	3.33c
Boston	3.83c-4.33c
Buffalo	3.25c
Chattanooga*	3.90c
Chicago	3.35c
Cincinnati	3.55c
Cleveland	3.25c
Detroit	3.40c
Los Angeles	5.85c
New Orleans	4.25c
New York	3.79c
Philadelphia	3.58c
Pittsburgh	3.20c
Portland (f)	4.75c
San Fran.(d)	5.85c
Seattle (f)	4.75c
St. Paul	3.20c
St. Louis	3.44c
Tulsa	4.65c

COLD ROLL. STRIP	□
Boston, 0.100-in., 500 lb. lots	5.20c
Buffalo	5.25c
Chicago (b)	5.65c
Cincinnati	5.80c
Cleveland (b)	5.55c
Detroit	5.40c
Philadelphia	4.55c
New York	4.55c
St. Louis	5.74c

(b) Net base, straightening, cutting, boxing, 1 ton or more.

(c) Plus mill, size and quantity extras.

(d) Minus quant. diff.

(e) New mill classif.

(f) Rounds only.

‡Domestic bars.

*Plus quan. extras.

**Under 25 bundles.

*†50 or more bundles.

†New extras apply.

††Base 40,000 lbs., extras on less.

Prices at Detroit, Cleveland, Chicago, Pittsburgh, Cincinnati, Chattanooga, New York, Boston, St. Louis on heavier lines are subject to new quantity differentials:

399 pounds and less, up 50 cents; 400 to 9999 pounds, base; 10,000 to 19,999 pounds, 15 cents under; 20,000 to 39,999 pounds, 25 cents under; 40,000 pounds and over, 35 cents under base.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, Dec. 7

Export Prices f. o. b. Ship at Port of Dispatch—By Cable (or Radio)

	British gross tons U. K. ports £ s d		Continental Channel or North Sea ports, metric tons Gold parity, $4.8665 £ s d	
PIG IRON				
Foundry, 2.50-3.00 Silicon	$14.95	2 18 6	$8.88	1 16 6
Basic bessemer	13.80	2 14 0*	7.30	1 10 0
Hematite, Phos. .03-.05	15.33	3 0 0	....	.....
SEMIFINISHED STEEL				
Billets	$28.11	5 10 0	$11.44	2 7 0
Wire rods, No. 5 gage	39.86	7 16 0	21.90	4 10 0
FINISHED STEEL				
Standard rails	$39.60	7 15 0	$26.77	5 10 0
Merchant bars	1.54c	6 15 0	.69c	3 2 6
Structural shapes	1.68c	7 7 6	.63c	2 17 6
Plates, †¼ in. or 5 mm.	1.82c	8 0 0	.89c	4 1 0
Sheets, black, 24 gage or 0.5 mm.	2.11c	9 5 0	1.27c	5 15 0
Sheets, gal., 24 gage, corr.	2.57c	11 5 0	1.60c to 1.76c	7 5 0 to 8 0 0
Bands and strips	1.77c	7 15 0	.83c	3 15 0
Plain wire, base	2.11c	9 5 0	1.18c	5 7 6
Galvanized wire, base	2.51c	11 0 0	1.38c to 1.40c	6 5 6 to 6 7 6
Wire nails, base	2.74c	12 0 0	1.27c	5 15 0
Tin plate, box 108 lbs.	$ 4.34	0 17 0	.....	.....

British ferromanganese $82 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d $(43.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

	£ s d		French Francs		Belgian Francs		Reich Marks	
Fdy. pig iron, Si. 2.5	$15.97	3 2 6(a)	$13.14	215	$13.27	305	$23.47	63
Basic bessemer pig iron	16.61	3 5 0(a)*	11.30	185	12.62	290	25.89	69.50
Furnace coke	3.83	0 15 0	7.33	120	4.79	110	7.17	19.25
Billets	28.11	5 10 0	24.75	405	19.14	440	35.95	96.50
Standard rails	1.88c	8 5 0	1.96c	700	2.20c	1,100(b)	2.23c	132
Merchant bars	1.71c	7 10 0	1.57c	560	1.07c	535	1.86c	110
Structural shapes	2.00c	8 15 0	1.54c	550	1.07c	535	1.82c	107.50
Plates, †¼-in. or 5 mm.	1.94c	8 10 0	1.90c	680	1.35c	675	2.15c	127
Sheets, black	2.34c	10 5 0§	2.38c	850‡	1.50c	750‡	2.43c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	2.91c	12 15 0	4.06c	1,450	3.00c	1,500	6.25c	370
Plain wire	2.11c	9 5 0	3.16c	1,130	2.20c	1,100	2.99c	177
Bands and strips	2.39c	10 10 0	1.82c	650	1.35c	675	2.15c	127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continental usually for basic-bessemer steel. a del. Middlesbrough. b Since January.

Bars

Bar Prices, Page 46

Consumers of soft steel bars are specifying against fourth-quarter contracts in good volume at about the recent rate. Mills are mostly interested in getting out shipments by the end of the year, as required by the steel code. Most contract tonnage will be taken out, because of the higher price for first quarter.

All tonnage booked after Jan. 1 will carry 1.75c, Pittsburgh, which is $3 above the price at which most fourth-quarter business was covered.

Chicago mills are booking from agricultural implement makers the heaviest tonnage in months from that source. Little forward business is being booked there. Rail steel bars are 1.70c, Chicago, and bar iron 1.60c, Terre Haute, Ind.

Orders from automotive forging shops, builders of road scrapers and machine tools are fairly good at Cleveland but contracting for first quarter is getting under way slowly. Mills are hastening shipments on fourth-quarter contracts.

New England consumers are doing little except specify fully their contracts for fourth quarter.

Alloy steel bars are steady at 2.45c, Pittsburgh, Chicago, Buffalo, Canton, O., or Massillon, O., base, and have been filed at that level for first quarter.

Plates

Plate Prices, Page 46

Much of the 4500 tons of plates and shapes awarded last week by the Pennsylvania, largely for construction of freight cars at its Altoona, Pa., shops, will be rolled by mills in the Pittsburgh district. From 4000 to 5000 tons of heavy plates for towers for the Tri-Borough bridge at New York probably will be rolled in the Pittsburgh district, as the towers will be fabricated by the American Locomotive Co. subsidiary at Dunkirk, N. Y.

Public service activities have caused an unusual demand for shovels and this has caused increased demand for light plates and heavy sheets for replenishing stocks of shovels. These are placed in small lots.

Efforts to specify and ship fourth-quarter tonnage before the end of the month has increased production of plates in practically all center. Not much is being done in new orders for spot or first quarter delivery as higher prices apply on these options. Tank, barge and railroad requirements, while potentially large, are not being converted into orders at the moment.

Cleveland platemaking facilities have been operated at a heavier rate on an accumulation of miscellaneous orders. Some complaint is heard against the code regulation requiring completion of shipments by Dec. 31. Some mills are informing customers specifications must be in by Dec. 15 to comply with this regulation.

Eastern Pennsylvania platemakers are interested in about 600 tons of plates to be awarded by Pusey & Jones, Wilmington, Del., for two lighthouse tenders. New bids may be asked on nine cutters as recent bids are said to exceed the appropriation. New York Shipbuilding Co., Camden, N. J., is estimating on alternates for one or two tankers requiring 5700 tons of plates, shapes and bars each, for the Standard Vacuum Transportation Co.

The navy will probably award by lot 6365 tons of plates, 7255 tons of bars and 2995 tons of shapes for delivery to navy yards at Brooklyn, N. Y., Philadelphia, and Charleston, S. C., on which bids were opened Dec. 1.

Chicago plate mills feel the lack of orders from tankmakers, railroads and river barge builders.

Prices are unchanged at the higher levels recently filed for first quarter.

Contracts Placed

1475 tons, four 80,000-barrel tanks, Pierce Oil Co., Tampico, Mex., to McClintic-Marshall Corp., Bethlehem, Pa.

1050 tons, five 54,000-barrel oil tanks replacements, New England Terminal Co., Tiverton, R. I., to Chicago Bridge & Iron Works, Chicago.

560 tons, wharf boat, Greenville, Miss., to Ingalls Iron Works Co., Birmingham, Ala.

289 tons, 22-inch pipe line, 14 gage, metropolitan water district, Los Angeles, to Southern Pipe & Casing Co., Los Angeles.

Unstated tonnage, tower and tank, department of agriculture, Brooksville, Fla., to Chicago Bridge & Iron Works, Chicago.

Unstated tonnage, two open deck steel barges, United States engineer, Chicago, to Midland Barge Co., Midland, Pa.; bids Nov. 10.

Contracts Pending

5700 to 11,400 tons, including bars and shapes, one or two tankers for Standard Vacuum Transportation Co., New York; New York Shipbuilding Co., Camden, N. J., making estimates.

8000 tons, penstocks on Owyhee, Snively and Malheur rivers, Oreg., for Owyhee federal irrigation project; bids not yet called.

1650 tons, bureau of supplies and accounts, navy, Brooklyn and Philadelphia, schedule 1344; bids Dec. 8.

1365 tons, liner plates, metropolitan water district, Los Angeles; bids Dec. 4.

600 tons, two lighthouse tenders; Pusey & Jones, Wilmington, Del., builder.

600 tons, liner plates, for Piney Branch relief sewage commission, Washington; bids Dec. 5.

400 tons, 1,000,000-gallon elevated water tank, Temple, Texas.

400 tons, lighthouse tenders, bureau of lighthouses, readvertised bids Nov. 24; Manitowoc Shipbuilding Co., Manitowoc, Wis., low on TAMARACK; Berg Shipbuilding Corp., Seattle, and Moore Shipbuilding & Dry Dock Co., Oakland, Calif., low on HOLLYHOCK.

300 tons, 500,000 and 200,000-gallon elevated water tanks, Houston, Tex.; federal loan approved.

200 tons, 500,000-gallon tank, Atlantic, Iowa; federal loan approved.

125 tons, 300,000-gallon water tank, Fort Meade, Md.; bids Dec. 8.

Unstated tonnages, 150,000-gallon tank, Auburn, Ill.; 80,000-gallon tank, Pawnee, Ill.; 50,000-gallon tank, Chatham, Ill.; federal loans approved.

Unstated tonnage, 1,000,000-gallon elevated water tank, Antioch, Ill.; 60,000-gallon elevated water tank, Rossville, Ill.; 75,000-gallon water tank, Selmer, Tenn.; 50,000-gallon tank, Stamps, Ark.

Unstated plates and shapes, three cutters for United States Health Service; Wallace Bridge & Structural Steel Co., Seattle, low.

Sheets

Sheet Prices, Page 46

Sheet producers are encouraged by the brighter outlook in the market, though the automotive industry is slow to contract for first quarter, due mainly to their stocks, and continuation of shipments to them on fourth quarter contracts.

Some orders for fill-in requirements for automobile builders were booked during the week. To complete fourth quarter specifications by the close of the year, northern Ohio sheet mills increased operations last week.

The refrigerator industry is getting under way in production for next year; orders from that source have increased, and larger tonnage is expected shortly. Chicago reports farm implement manufacturers taking only small lots, but an increase in their tonnage anticipated for next quarter.

The E. G. Budd Mfg. Co., Philadelphia, has been awarded an automobile tag contract by New Jersey, requiring approximately 900 tons of No. 20 gage black sheets. The bureau of supplies and accounts, navy

department, Washington, is taking bids Dec. 12 on 200 tons of No. 16 gage blue annealed sheets for powder cans.

Miscellaneous requirements at Pittsburgh engage sheet mill capacity at 30 per cent. Birmingham and Cincinnati report demand has improved slightly; at St. Louis the market is quiet. Light business is reported in New England.

The advance of $3 a ton in the price of tin mill black sheets, to 2.65c, base, Pittsburgh, now is in effect. Other prices are steady.

Smead & Co., Jersey City, N. J., is purchasing 250 tons of furniture sheets for library stacks in the treasury department, Washington.

Railroads

Track Material Prices, Page 47

Distribution by the Pennsylvania of 100,000 tons of steel rails was the leading feature of the railroad market the past week. Bethlehem Steel Co. received 44,000 tons, Carnegie Steel Co. 42,000 tons, Illinois Steel Co., 8000 tons and Inland Steel Co. 6000 tons. Bethlehem was also given 350 tons of girder rails for use in city streets.

Pittsburgh & West Virginia has awarded 1000 tons of rails to Carnegie Steel Co., pending approval of a federal loan. The Erie will place 30,000 tons of rails and 12,000 to 15,000 tons of fastenings during January. This is 6000 tons more than its order for 1932.

Distribution of the remaining 58,650 tons of steel in the inquiry for 159,000 tons for the Pennsylvania on which bids were opened Nov. 23 is not announced, although the track accessory tonnage, making most of this remainder, was widely spread among suppliers. The Pennsylvania also will take bids Dec. 20 on further miscellaneous requirements, including wheels, axles, piston heads, steel pipe, boiler tubes, and pig iron.

Edgar Thomson rail mill of the Carnegie Steel Co. at Braddock, Pa., is operating interruptedly on an uncompleted rail order for Brazil. This mill, as well as others receiving the Pennsylvania rail award, does not expect to roll that tonnage much before March, for spring delivery.

Chicago mills, except for the Pennsylvania distribution, have booked little rail tonnage as western roads have been delayed in completing their federal loans. Equipment repairs have not yet called for important tonnages. Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., will reopen its rail mill Dec. 13.

General American Transportation Corp., New York, has booked four 8000-gallon aluminum tank cars for Union Carbide & Carbon Corp., New York, and ten tank cars for Mathieson Alkali Works, New York. Kansas City Southern has awarded 100 box cars to its own shops. Northern Pacific is expected to award 12 locomotives at once. Freight car awards in November totaled 533. Comparisons follow:

	1933	1932	1931	1930
Jan.	3	159	100	5,072
Feb.	0	35	50	17,027
March	5	105	2,166	6,118
April	50	0	2,798	1,997
May	8	60	20	1,392
June	500	0	1,910	998
July	306	25	617	1,389
Aug.	202	5	1,304	1,111
Sept.	23	1,298	703	576
Oct.	514	0	980	4,116
Nov.	533	2	35	2,621
11 Mo.	2,144	1,689	10,683	42,417
Dec.	.....	50	11	2,729
Total	.....	1,739	10,694	45,146

Missouri-Kansas-Texas has asked permission of the interstate commerce commission to abandon nine branch lines totaling 100 miles. This company will also dismantle 3000 freight cars.

Loan of $3,500,000 to the New York, New Haven & Hartford and $2,000,000 to the Lehigh Valley have been made by the public works administration for repairing and rebuilding cars and other equipment. These are first loans to railroads for reconditioning purposes. Others are being negotiated.

Harold L. Ickes, public works administrator, has announced that if the Pennsylvania does not accept the government loan offered it some time ago by Dec. 14 he probably will withdraw the offer. This is a loan of $84,000,000 for electrification of the New York-Washington line and construction of electric locomotives and cars.

Car Orders Placed

Kansas City Southern, 100 box cars, to own shops at Pittsburgh, Kans.

Mathieson Alkali Works, New York, 10 tank cars to General American Transportation Corp., New York.

Union Carbide & Carbon Corp., New York, four 8000-gallon aluminum tank cars, to General American Transportation Corp., New York.

Rail Orders Placed

Pennsylvania railroad, 100,000 tons of 112, 131 and 152-pound sections, divided as follows: Bethlehem Steel Co., 44,000 and 350 tons girder rail; Carnegie Steel Co., 42,000 tons; Illinois Steel Co., 8000 tons; and Inland Steel Co., 6000 tons. Delivery asked by July 1, 1934.

Pittsburgh & West Virginia, 1000 tons, to Carnegie Steel Co., Pittsburgh, pending approval of federal loan.

Locomotive Orders Pending

Northern Pacific, 12 locomotives, award expected soon.

Rail Orders Pending

Erie, 30,000 tons, with 12,000 to 15,000 tons of fastenings.

Pipe

Pipe Prices, Page 47

Federal public works loans to municipalities planning extensions and replacements to water mains are building up a fair volume of cast pipe business. Much of this work still is pending, but should be closed before the winter is over.

Production in the Birmingham, Ala., district has advanced, the Lynchburg plant of Alabama Pipe Co., Anniston, Ala., having resumed operations, making stock, standard sizes, 200 men being called back to work.

Reports from Pittsburgh note that revised discounts on boiler tubes, both hot-rolled and cold-drawn, in sizes from 1¾ to 4-inch, inclusive, are now quoted on the higher schedule as of Dec. 1.

Hesitancy in closing on pending projects is reported in Chicago. Pending cast pipe business there includes 2345 tons of 12-inch for Chicago and 1050 tons of 4-inch for Wilmette, Ill.

Cast pipe inquiry at Boston is heavier, stimulated by demand for material for welfare work and water-main extension.

New York will require about 600 tons of cast pipe for use in connection with projects planned as employment aids.

Cast Pipe Placed

800 tons, 6 to 12-inch, Croton-on-Hudson, N. Y., to R. D. Wood & Co., Florence, N. J.

800 tons, mostly 10-inch, Wappinger Falls, N. Y., to Donaldson Iron Works Emaus, Pa.

600 tons, 6 to 18-inch, Yonkers, N. Y., to Donaldson Iron Works, Emaus, Pa.

400 tons, pipe and fittings, Norris, Tenn., Tennessee Valley Authority, to National Cast Iron Pipe Co., Birmingham, Ala.

350 tons, 6, 8 and 12-inch, Fort Meade, Maryland, to R. D. Wood & Co., Florence, N. J.

200 tons, 12-inch, Fort Monroe, Va., to McWane Cast Iron Pipe Co., Birmingham, Ala.

150 tons, 4 to 12-inch, Yakima, Wash.,

to Pacific States Cast Iron Pipe Co., Provo, Utah.

Cast Pipe Pending

900 tons, 24-inch, watermains, Worcester, Mass.; bids soon.
600 tons, welfare work material, New York.
230 tons, 4, 6 and 8-inch, Macon, Ill.; bids soon.
200 tons, Forest Grove, Oreg.; bids in.
Unstated tonnage, 4400 feet, 24 or 30-inch, new intake, Superior Water, Light & Power Co., Superior, Wis.; bids soon.
Unstated tonnage, watermains, Pocatello, Idaho; federal loan of $150,000 has been granted.
Unstated tonnage, watermain extensions, fire hydrants, pumps, Aurora, Ill.; expenditure of $450,000 will be made.
Unstated tonnage, watermain extension, Joliet, Ill., to cost $1,250,000; may seek federal loan.
Unstated tonnage, 12 and 16-inch, water main extension, also pump house and new boilers, Pontiac, Mich., to cost $280,200; federal aid sought.
Unstated tonnage, watermain extension and replacement, Standish, Mich.; $52,000 bond issue to be voted.
Unstated tonnage, 4.5 miles, 20-inch, water supply system, International Falls, Minn.; $175,000 bond issue to be voted.

Wire

Wire Prices, Page 47

Specifications on fourth quarter contracts for wire and wire products have increased substantially since prices have been advanced for the remainder of the year and first quarter. With consumers taking in all the tonnage due them, not much contracting is expected to develop until after the first of the year. Consumption shows some increase, especially in automotive lines.

Advanced prices have been applied on small spot orders for nails, wire fencing and other wire products. However, buying is light, as consumers were well covered when the advance was made.

Shipments at Chicago show some improvement, with automtive users and agricultural implement builders taking somewhat larger lots. Pittsburgh makers find shipments steady and at a good rate.

In New England there has been some disappointment as consumer stocks are heavy and retard the flow of specifications. Much interest is shown by wiremakers in forthcoming bids on the suspension span cables for the Little Hell Gate portion of the Triboro bridge at New York. This will require about 7400 tons of wire, castings, suspender cables and other materials, mostly wire.

The new prices on nails, applying for current and first quarter delivery, are $2.35, Pittsburgh, $2.40, Chicago; plain wire, 2.20c, Pittsburgh, and 2.25c, Chicago.

Tin Plate

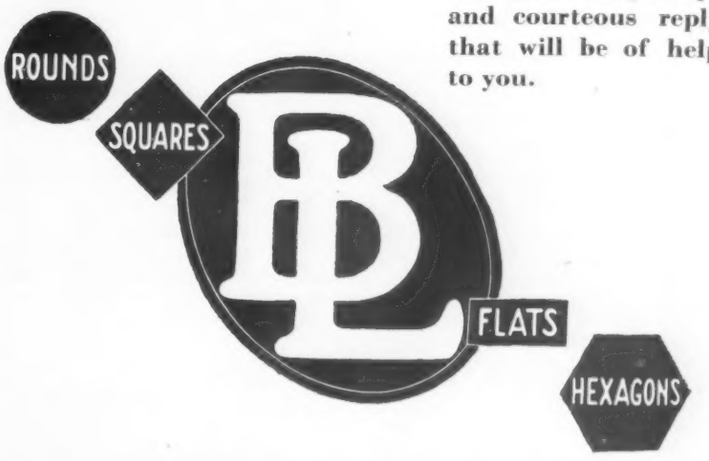
Tin Plate Prices, Page 46

Pittsburgh—Tin plate mill operating schedules are being curtailed and this will be down to 75 per cent, after holding near capacity since May, 1933. Producers still are busy processing plate so that it can be shipped on contracts which expire Dec. 31. No important contracts have been closed at $5.25 per base box, Pittsburgh, for standard tin plate. Canmakers are well stocked for first quarter.

Continental Steel Co. has installed a Surface Combustion Corp. galvanizing furnace at Kokomo, Ind., using oil gasification equipment.

COLD DRAWN STEELS

As part of your plans for the coming year we would like to invite your attention to B & L's cold finished bar steels. Whether your problems be of ordinary nature or a complicated one, we feel that we can be of help to you the same as we have to so many others in the past. Mention your problems or desires to our Representative or Field Service Engineers on their next call at your plant, or mail them in direct. You will receive a prompt and courteous reply that will be of help to you.



Bliss & Laughlin, Inc.

Harvey, Ill. Buffalo, N. Y.

Sales Offices in all principal cities

Shapes

Structural Shape Prices, Page 46

Structural shape awards for the week are lighter, with pending tonnage continuing to increase, mainly for public work.

In some quarters it is believed public work contracts are not being closed more rapidly because the structural steel fabricators' code has not yet been approved, though nearing that stage.

Contractors bidding on public work are aided by the steel industry's resolution No. 34. As heretofore, mills will protect them with specific prices for 60 days, for the purpose of bidding. The amendment, however, removes the time limit on shipments.

This means that if a contractor obtains a job and buys the steel within the 60-day period, he need not take the steel until it is actually required.

More than 10,000 tons of structural shapes and piling are active for Mississippi lock work, closing this month, in addition to the recent heavy awards for such projects. Awards for the week at Chicago total about 3600 tons, mainly for locks.

Bids go in Dec. 27 for the third time on the Manhattan, N. Y., midtown postoffice annex superstructure, 12,000 tons. Walsh Construction Co., Syracuse, N. Y., is low on the general contract for New York Central grade eliminations, that city, taking 13,000 tons.

A Pittsburgh mill is expected to roll 12,500 tons of angles, beams and heavy plates for the Triboro, New York, bridge towers, which will be fabricated by the American Locomotive Co., Dunkirk, N. Y.

At Cleveland bids are being taken on 1200 tons for trusses for the easterly sewage disposal plant. Libbey-Owens-Ford Glass Co., Toledo, has revived plans for a building, requiring 900 tons.

Structural shapes remain 1.70c, base, Pittsburgh; and steel piling 2.00c.

SIXTY BILLION SCUFFLING FEET GRIND AWAY FOR EIGHTEEN YEARS

on "AW" Rolled Steel Floor Plate

Muddy boots and Paris pumps, high heels and hobnails—a ceaseless parade pounds and shuffles and scuffs along for eighteen years before the Rolled Steel floors in the vestibules of New York City's subway cars give up the battle and are ready for replacement.

In all the world there is no other service so severe—no other floor material which could meet that drastic test.

Alan Wood rolls floor plate in the safe and scientific Diamond and Diamondette patterns for service of any kind and in any ferrous or non-ferrous metal. Use it and you will enjoy long life and sure protection for your shop floors, trench covers, runways, platforms, balconies and the like.

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We gladly work on difficult problems.

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ALAN WOOD STEEL CO.

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107 Years Iron and Steel Making Experience

Branch Offices:

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New York
San Francisco
Los Angeles
Houston

Contracts Placed

2700 tons, Hamilton field, Calif., to Consolidated Steel Corp., Los Angeles.

1938 tons, state bridge, Parkers Landing, Pa., to McClintic-Marshall Corp., Bethlehem, Pa.

1500 tons Woodside housing development, New York, to J. Klein Iron Works Inc., Astoria, N. Y.

1135 tons, lock No. 21, Quincy, Ill., to Mississippi Valley Structural Steel Co., St. Louis.

750 tons, highway bridges, Nebraska, to Omaha Steel Works, Omaha, Nebr.

600 tons, bridge, Wrightstown, Wis., to Worden-Allen Co., Milwaukee.

400 tons, piling, bridge, Utica, N. Y., to Inland Steel Co., Chicago; John Mackler & Co., Chicago Heights, Ill., general contractor.

375 tons, state bridge South Umpqua river, Douglas county, Oregon, to unnamed interests.

364 tons, state crossing at Spokane, Wash., to unnamed eastern interest.

Shape Awards Compared

	Tons
Week ended Dec. 9	12,568
*Week ended Dec. 2	31,070
Week ended Nov. 25	15,077
This week in 1932	34,597
Weekly average for 1932	17,429
Weekly average, 1933	14,697
Weekly average, Nov.	16,020
Total to date, 1932	823,510
Total to date, 1933	734,841

*Revised

350 tons, for Wilhelm Paint Co., Reading, Pa., to Reading Steel Products Co., Reading, Pa.

350 tons, overhead crane structures, navy yard, Brooklyn, N. Y., to Orton Crane & Shovel Co., Chicago; $218,730; bids Oct. 11.

260 tons, two 198-foot trusses, Clay county, Indiana, to Vincennes Bridge Co., Vincennes, Ind.

225 tons, bridge, Woolwich, Me., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

189 tons, seaplane hangar, United States coast guard, St. Petersburg, Fla., to Ingalls Iron Works Co., Birmingham; E. B. Ring Inc., St. Petersburg, general contractor. D. F. Taylor Inc., Tampa, awarded reinforcing bars.

180 tons, bridge, New Hampshire avenue over Baltimore & Ohio railroad tracks, Washington, to Phoenix Bridge Co., Phoenixville, Pa.; through Arthur McMullen Co.

160 tons, magazine and shell house, ammunition depot, Lake Denmark, N. J., to Frank M. Weaver & Co. Inc., Lansdale, Pa.; A. W. Funk & Co., Philadelphia, general contractor.

150 tons, shapes and bars, hangar for coast guard, Winter Island, Salem, Mass.; Concrete Construction Co., Chelsea, Mass., low.

150 tons, bridge, Russellville, Ark., to Virginia Bridge & Iron Co., Roanoke, Va.

140 tons, state bridge, project NRH 201-E, West Virginia, to Pittsburgh-Des Moines Steel Co., Pittsburgh; Monty Bros., Charleston, W. Va., general contractor.

125 tons, crane runway, Timken Roller Bearing Co., Canton, O., to Canton Structural Steel Co., Canton, O.

110 tons, Douglas negro high school, Oklahoma City, Okla., to Capitol Steel & Iron Co., Oklahoma City; Pelties & Fitzgibbons, Oklahoma City, general contractors.

110 tons, Children's hospital building, Holtsville, N. Y., to George A. Just Co., Long Island City, N. Y.

107 tons, state bridges in two counties in Colorado, to unnamed interests.

100 tons, bridge, Jewelsburg, Colo., to Minneapolis-Moline Power Implement Co., Minneapolis.

100 tons, bridge, Overton, Nebr., to St. Joseph Structural Steel Co., St. Joseph, Mo.

Contracts Pending

12,000 tons, superstructure, midtown postoffice annex, (Manhattan) New York; bids Dec. 27; readvertised for third time.

12,000 tons, bridges and grade eliminations, New York Central railroad, Syracuse, N. Y.; Walsh Construction Co., Syracuse, low.

4000 tons, shapes and piling twin locks, lock and dam No. 26, Mississippi river, Alton, Ill.; bids Dec. 19 to United States engineer, St. Louis. Project also takes approximately 275 tons of steel and alloy castings and forgings. Steel floor grating, 6768 square feet.

3500 tons, including 2500 tons, piling, lock No. 22, Saverton, Mo.; bids Dec. 22, to Rock Island, Ill., federal engineers.

2500 tons, steel sheet piling, dam, Cape Fear river, North Carolina; William Eisenberg & Sons Co., Camden, N. J., low for general contract.

1450 tons, Park avenue bridge, Oakland, Calif.; plans completed.

1200 tons, lock No. 18, Burlington, Iowa; bids Jan. 3, to Rock Island, Ill., federal engineers.

1200 tons, lock No. 11, Dubuque, Iowa; bids Jan. 11, to Rock Island, Ill., federal engineers.

1200 tons, lock No. 12, Bellevue, Iowa; bids Jan. 23, to Rock Island, Ill., federal engineers.

1200 tons, lock No. 10, Guttenberg, Iowa; bids Jan. 30, to Rock Island, Ill., federal engineers.

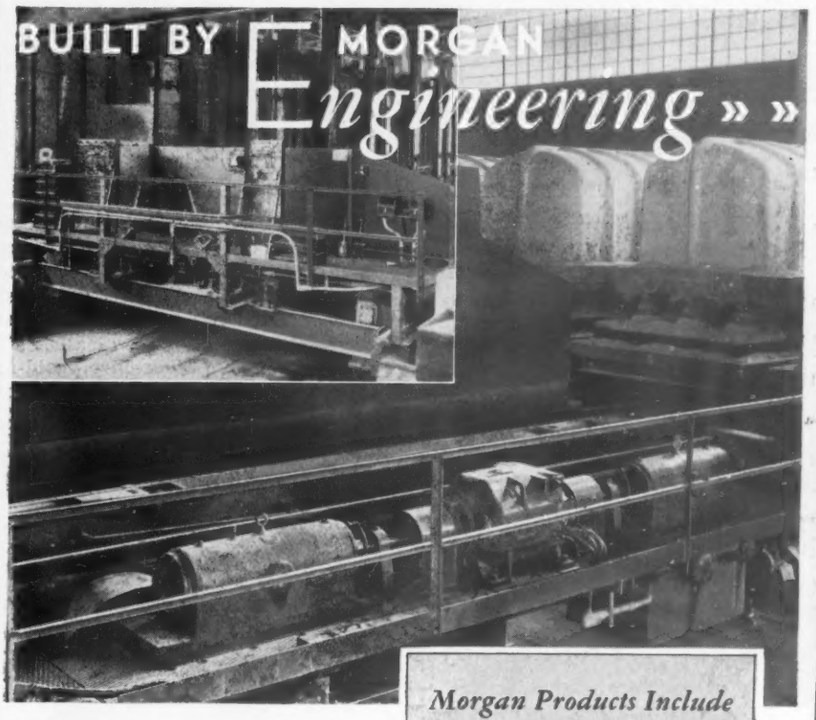
1200 tons, lock No. 14, LeClaire, Iowa; bids Feb. 6, to Rock Island, Ill., federal engineers.

1200 tons, trusses for tank covers, easterly sewage disposal plant, Cleveland; bids being taken.

900 tons, building for Libbey-Owens-Ford Glass Co., Toledo, O.; plans revived, and bids taken.

800 tons, angles, channels and I-beams, bureau of supplies and accounts, navy, Brooklyn and Philadelphia, schedule 1348; bids in Dec. 8.

500 tons, high school, Hamden, Conn.



MORGAN ENGINEERING keeps pace with the steel industry. When the continuous sheet mill became a unit of modern steel production equipment, it required in conjunction annealing furnaces of equal capacity, and these in turn required mobile handling facilities for their charge. The Morgan *Patented* Annealing Car Pusher met this requirement for large steel producers. One of several of these machines used by a great steel company is shown, designed for normally handling one car at a time, but capable of handling 15 loaded cars of 80 tons each. All motions are controlled from one position on the operator's platform, the entire machine designed and built by Morgan to withstand successfully the severe service expected of it.

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DESIGNERS
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CONTRACTORS

THE MORGAN ENGINEERING COMPANY

New York, 11 W. 42d St. ALLIANCE, OHIO *Pittsburgh, 1420 Oliver Bldg.*

500 tons, state hospital building, Manteno, Ill.
410 tons, state bridge, Greene county, Pennsylvania; bids Dec. 15.
380 tons, Russian river bridge at Monte Rio, Calif., for Santa Rosa county; bids Dec. 8.
350 tons, grade crossing, Dishman, Wash.
300 tons, bridge, Milk river, United States engineer, Kansas City, Mo.; bids Dec. 18.
300 tons, Mt. Tremper and Napanoch bridges, Ulster county, New York; Intercounty Construction Co., Rye, N. Y., low on former; John Roman Inc., Bronxville, N. Y., low, Napanoch.
250 tons, air corps double hangar and boiler house, Fort Benning, Ga.; bids Dec. 12.
200 tons, seaplane hangar, United States coast guard, Galveston Island, Tex.; bids Dec. 12.
173 tons, plate girder span, Somerset county, Pennsylvania; bids Dec. 22.
150 tons, placing, Hyrum dam, Ogden, Utah; bids Dec. 13.
150 tons, approximately, repairs to state bridge, Ashtabula, O.; bids Dec. 11.
110 tons, bridge, Wilkerson creek, United States engineer, Wilmington, N. C.; Tidewater Construction Co., Norfolk, Va., low.
100 tons, state bridge, Washington county, Pennsylvania; bids Dec. 15.
100 tons, bridge, Camden, Ark.
100 tons, bridge, Danville, Miss.
Unstated tonnage, $10,000,000 project to bridge Straits of Mackinac, now being considered by Gov. Comstock, of Michigan, and state legislators; to be financed with federal funds.
Unstated tonnage, Wayne county, Michigan, hospital building, to cost $1,375,000; federal aid sought.
Unstated tonnage, new buildings and remodeling, Athens, O., state hospital; to cost $500,000; federal aid sought.
Unstated tonnages, bids rejected on following postoffice projects, as no funds have been allocated in most instances: Portsmouth, O.; Bradenton, Fla.; Ely, Nev.; Dover, N. J.; North Hollywood, Calif.; Rapid City, S. Dak.; Sabine Pass, Tex.; quarantine station and wharf; Fort Lauderdale, Fla., Phoenix, Ariz.; Segun, Tex.; Silver City, N. Mex. Ventura, Calif.; Waynesboro, Pa.; Winter Haven, Fla.; Wilmington, N. C.; Westminster, Md.; Fort Stanton, N. Mex., marine hospital.

Cold Finished

Cold Finished Prices, Page 47

Demand for cold-finished steel bars based on 1.95c, Pittsburgh, was fairly strong through last week. This buying has been caused by the general knowledge that a $3 a ton advance becomes effective at all basing points Jan. 1. Therefore, cold-finished bar users will have the balance of this month to complete specifications and shipments under the old price. Several sizable orders from the automotive field are noted.

Reinforcing

Reinforcing Bar Prices, Page 47

Public works projects up for bids are increasing in number, and the market is steadier.

Mill lengths of new billet bars remain 1.80c, Pittsburgh, in carload lots; or 1.90c, Pittsburgh, for cut lengths. The distributors' price remains at the usual $4 a ton differential, or 1.60c, Pittsburgh.

The market in New York is more active. Pennsylvania is opening bids on road work at the rate of 200 to 300 tons weekly. Cleveland fabricators are figuring on 1000 tons for a culvert in Brook park, Cleveland, a CWA project. Cape Cod, Mass., highway bridge substructures taking 1100 tons are to be awarded shortly.

At Chicago awards of 1600 tons, the largest in several weeks, include about 1000 tons for river locks at La Crosse and Trempealeau, Wis., and Muscatine, Iowa.

Bids are being taken at St. Louis on the twin lock at Alton, Ill., requiring 1500 tons, while 350 tons are pending for a state hospital at Manteno, Ill.

Quantity extras adopted by Chicago mills on billet bars, effective Dec. 1, are the same as those already in effect on rail steel bars. Orders of 5 to 15 tons take an extra 15 cents per 100 pounds; 1 to 5 tons, 25 cents; less than 1 ton, 50 cents. Contractors there now are sold only on the cut length basis of 1.95c for billet bars, with rail steel continuing 1.80c.

Contracts Placed

850 tons, drydock, Philadelphia yard, to Concrete Steel Co., Philadelphia.
800 tons, barracks, Fort Benning, Ga., to Connors Steel Co., Birmingham.

One of 30,000 STAMPINGS

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CROSBY Stamping Engineers

Since 1896 the Crosby plant has been devoted, exclusively, to designing and producing Sheet Metal Stampings. Avail yourself of this experience. Send us your next stamping problem and watch results.

THE CROSBY COMPANY

BUFFALO, N. Y.

Branch Offices:

New York, Philadelphia, Pittsburgh,
Cleveland, Detroit, Chicago.

Concrete Awards Compared

	Tons
Week ended Dec. 9	2,843
Week ended Dec. 2	5,130
Week ended Nov. 25	4,386
This week in 1932	2,620
Weekly average for 1932	3,920
Weekly average, 1933	3,552
Weekly average, Nov.	3,253
Total to date, 1932	200,905
Total to date, 1933	177,631

Ala.; through Southern Ferroconcrete Co., Atlanta, Ga.
400 tons, lock No. 6, Mississippi river, near Trempeauleau, Wis., to Kalman Steel Corp.; Spencer, White & Prentice, New York, general contractors.
325 tons, lock No. 7, La Crosse, Wis., to Kalman Steel Co., Bethlehem, Pa.
315 tons, power plant, Springfield, Ill., to Laclede Steel Co., St. Louis.
300 tons, officers' quarters, Fort Sam Houston, San Antonio, Tex., to Concrete Engineering Co., Chicago.
300 tons, lock No. 21, near Quincy, Ill., to Laclede Steel Co., St. Louis; James Meltzer Inc., general contractor.
180 tons, state road, Susquehanna county, Pennsylvania, to Kalman Steel Corp., Bethlehem, Pa.
175 tons, two state road projects in Berks and Sullivan counties, Pennsylvania, to Kalman Steel Corp., Bethlehem, Pa.
103 tons, state highway work in six counties, California, to unnamed interests.
100 tons, Douglas negro high school, Oklahoma City, Okla., to Capitol Steel & Iron Co., Oklahoma City; Pelties & Fitzgibbons, Oklahoma City, general contractors.
100 tons, mesh and bars, highway and bridge, Westchester county, New York, to Truscon Steel Co., Youngstown, O.; through Patterson & Rossi Inc.
100 tons, state highway bridge, Ravenswood, W. Va., to Truscon Steel Co., Youngstown, O.

Contracts Pending

1514 tons, twin locks, and dam No. 26, Mississippi river, Alton, Ill.; bids Dec. 19 to United States engineer, St. Louis.
1500 tons, twin lock No. 26, Alton, Ill.; bids Dec. 19 to United States engineer, St. Louis.
1000 tons, Boulder dam, Boulder City, Nev., schedule 23022-A; Soule Steel Co., Los Angeles, low.
1000 tons, bridges and grade eliminations, New York Central railroad, Syracuse, N. Y.; Walsh Construction Co., Syracuse, low.
1000 tons, culvert, Brook park, Cleveland; CWA project; first section now being figured.
650 tons, lock No. 22, Mississippi river, near Saverton, Mo.; bids Dec. 21 to United States engineer, Rock Island, Ill.
550 tons, Park avenue bridge, Oakland, Calif.; plans completed.
500 tons, substructure, railroad lift bridge, Cape Cod canal, Buzzards Bay, Mass.; C. W. Blakeslee & Sons Inc., New Haven, Conn., and Blakeslee-Rollins Corp., Boston, low, joint bid $325,000.
350 tons, lock No. 5-A, Winona, Minn.; bids in Dec. 8 to St. Paul federal engineers.
350 tons, state hospital, Manteno, Ill.
250 tons, roller crest dam, Montgomery island, Ohio river near Pittsburgh; bids to Pittsburgh federal engineers Dec. 12.
231 tons, state highway work, Los Angeles county, California; bids Dec. 20.
200 tons, state highway work, Hunterdon county, New Jersey; general contract to Riverside Cement Co.
200 tons, placing only, for Hyrum dam, Ogden, Utah; bids Dec. 13.
151 tons, bridge at Cornwall and Lord streets, Los Angeles; plans completed.
100 tons, approximately, plain steel bars for bridge and highway work for Greene, Lancaster and Washington counties, Pennsylvania; bids Dec. 15, department of highways, Harrisburg, Pa.

Semifinished Steel

Semifinished Prices, Page 47

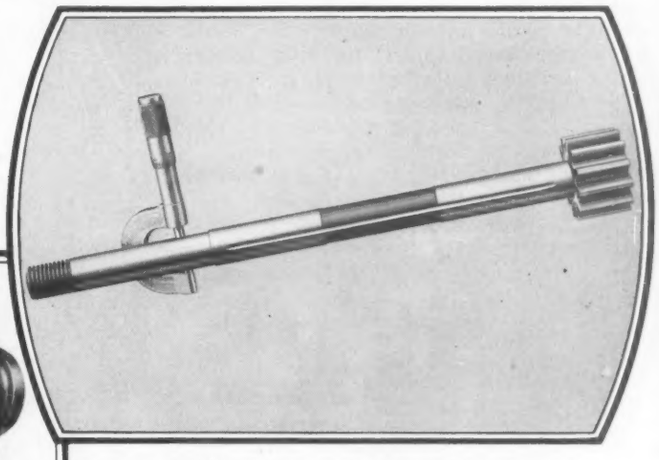
A few small sales of wire rods are noted at $36, Pittsburgh. However, considerably more tonnage is being specified on $35 contracts, which expire Dec. 31. The market for sheet bars, billets and slabs is quiet, at $26, Pittsburgh. With lower tin plate mill schedules, shipments of sheet bars to the mills have declined.

Steel Co. of Canada, Hamilton, Ont., is installing a Surface Combustion Corp. walking beam normalizing furnace for sheets.

ACCURACY—PRECISION!

the keynote of quality in

TRADE YALE MARK CHAIN HOISTS



The Yale Chain Hoist Driving Pinion and Gear

Yale 1 Ton Spur-Geared Chain Hoist

Would you expect to find such mirror-like finish on the individual parts of a Chain Hoist?

The Drive Pinion is carefully ground to a working tolerance of .001 inch.

Precision and accuracy of construction and finish of each integral part are responsible for the efficiency and endurance so characteristic of Yale Chain Hoists and Trolleys.

Absolute uniformity is also assured because every production operation is under the hand of an expert.

Be sure the hoist you buy is marked YALE—"From Hook to Hook a Line of Steel."

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Philadelphia, Pa., U. S. A.
Philadelphia Division
Makers of Yale Electric and Hand Chain Hoists, Trolleys, Electric Trucks, and Hand Lift Trucks.

NRA MEMBER U.S. WE DO OUR PART

Pig Iron

Pig Iron Prices, Page 48

Reawakened interest in first-quarter needs is slowly stimulating pig iron business, with shipments on expiring contracts continuing to hold up well.

A merchant furnace at Cleveland booked 4000 tons during the week, more than double its average weekly orders in the past month. Melt at automobile, railroad and some jobbing foundries in this district is reported better. Base price at Cleveland for No. 2 foundry iron remains $17.50.

Unconfirmed reports state that a nonintegrated steel mill in Ohio, but closer to the Pittsburgh producing district than any other, has placed an order for 10,000 tons of basic iron with a merchant interest, for first-quarter delivery. Market on foundry iron at Pittsburgh is slower than in recent months, feeling the effects of the inroads of scrap and wider use of welded plate construction. A pipe foundry near Pittsburgh, closed for over a year, may reopen soon. Pig iron needs have not yet been indicated.

Chicago reports new business expanding at an encouraging rate and prospects for first quarter gradually more favorable. December movement is expected to equal or better that of November.

Interest in first-quarter needs thus far has been confined to small tonnages in the Cincinnati district, with prices unchanged.

Five blast furnaces continue in production at Buffalo, with more iron shipped this month than was sold. Early 1934 buying will be slow, in the opinion of the trade.

One large steelworks in the New England district has conserved stocks of pig iron as a result of heavy scrap melt. Sales in this territory are light, with needs of larger consumers uncertain.

Blowing out or banking of two blast furnaces of independent foundry iron producers in the Birmingham, Ala., district is contemplated, as buying continues in small lots.

Interest in pig iron needs among Canadian melters is lagging, according to reports from Toronto, Ont. No advance buying is reported there.

Extension of present prices into first quarter and opening of books for that period has failed to stimulate purchasing at St. Louis. Consumer stocks are high in many instances.

Specifications against old contracts are reported fairly brisk in the New York district, but contracting for the first quarter is negligible.

PHOENIX ROLLS

For more than sixty years PHOENIX ROLLS have been the standard of comparison and service throughout the steel mills of the world, rolling millions of tons of steel annually.

PHOENIX SERVICE: has come to mean a continuing interest in every roll we sell until its full life has been obtained.

Recently modernized Open Hearths, Air Furnaces, Grinding and Finishing equipment enable us to lead the present day trend toward more durable rolls which will give better finish and reduced rolling mill costs.

Our latest development, PHOENIXLOY, a uniformly hard roll, is giving service today in many flat rolling mills which only two years ago was thought impossible.

Phoenix Metal Rolls
Phoenix "A" Rolls
Phoenix "K" Rolls
Phoenix Tube Mill Rolls
Phoenix Chill Rolls
Phoenix Nickel Chill Rolls
Phoenix Steel Rolls
Phoenix Sand Rolls

PHOENIXLOY
(Uniformly Hard)

PITTSBURGH ROLLS CORPORATION
PITTSBURGH, PA.

Iron Ore

Iron Ore Prices, Page 48

Cleveland — Lake shipments of iron ore for the season 1933, as finally reported by the Lake Superior Iron Ore association, amounted to 21,623,898 tons. This is exclusive of approximately 50,000 tons, shipped all-rail from mines to furnaces.

The movement was much like that of 1931, in which year 23,467,786 tons were shipped by the lake route. Producers look forward to 1934 to approach the total of 46,582,982 tons, as shipped in 1930.

Following is the report of shipments for the season from the upper lake ports:

Port	Tons
Escanaba	1,647,980
Marquette	2,622,584
Ashland	2,400,769
Superior	5,835,101
Duluth	5,839,523
Two Harbors	3,277,941
Total	21,623,898
1933 Increase	18,055,913

Following are total lake shipments for the past ten years:

	Tons		Tons
1924....	42,623,572	1929....	65,204,600
1925....	54,081,298	1930....	46,582,982
1926....	58,537,855	1931....	23,467,786
1927....	51,107,136	1932....	3,567,985
1928....	53,980,874	1933....	21,623,898

New York—Foreign iron ores are up, due mainly to a sharp increase in British demand, but also reflecting increased freight rates and variations in foreign exchange. Further increases are expected within ten days. At the new levels, some ores represent a price of 50 per cent over the July lows.

Coke

Coke Prices, Page 47

Connellsville, Pa., beehive coke continues to be quoted at the market inaugurated in October. This schedule, centering around $3.75, ovens, for furnace coke, with $4.25 and $5.25 for foundry coke, likely will continue unchanged into early

1934. Metallurgical coke is in slow demand and few melters have been in the market recently. However, all buying is at quoted code prices. Incorporating the recent 50-cent advance in by-product coke, the market on this grade is now $4, Pittsburgh.

Increasing foundry operation at Chicago has brought moderate gain in by-product coke shipments over November. Quotations continue at $8.50, ovens, for outside delivery and $9.25 for Chicago delivery. St. Louis consumers have larger stocks than usual and buying is curtailed, with prices steady.

Birmingham, Ala., producers and consumers find little change in conditions and prices are unchanged.

Scrap

Scrap Prices, Page 49

Pittsburgh—The market on No. 1 heavy melting steel advanced 50 cents in this district last week to $11.75 to $12.25. A still stronger scrap market appears in the making and the upward movement was confirmed by successful bids on the Baltimore & Ohio and Pennsylvania lists. A recent sale of machine shop turnings at $8 has been recorded. The cast market appears to be headed upward in view of the inquiry out here by a district foundry for about 10,000 tons of cupola cast scrap. Norfolk & Western is closing on a large list, Dec. 5.

Cleveland—Some small railroad lists have given the market for steel and iron scrap its only activity. Light shipments of blast furnace material and some cast covers practically the entire movement. Prices show no change.

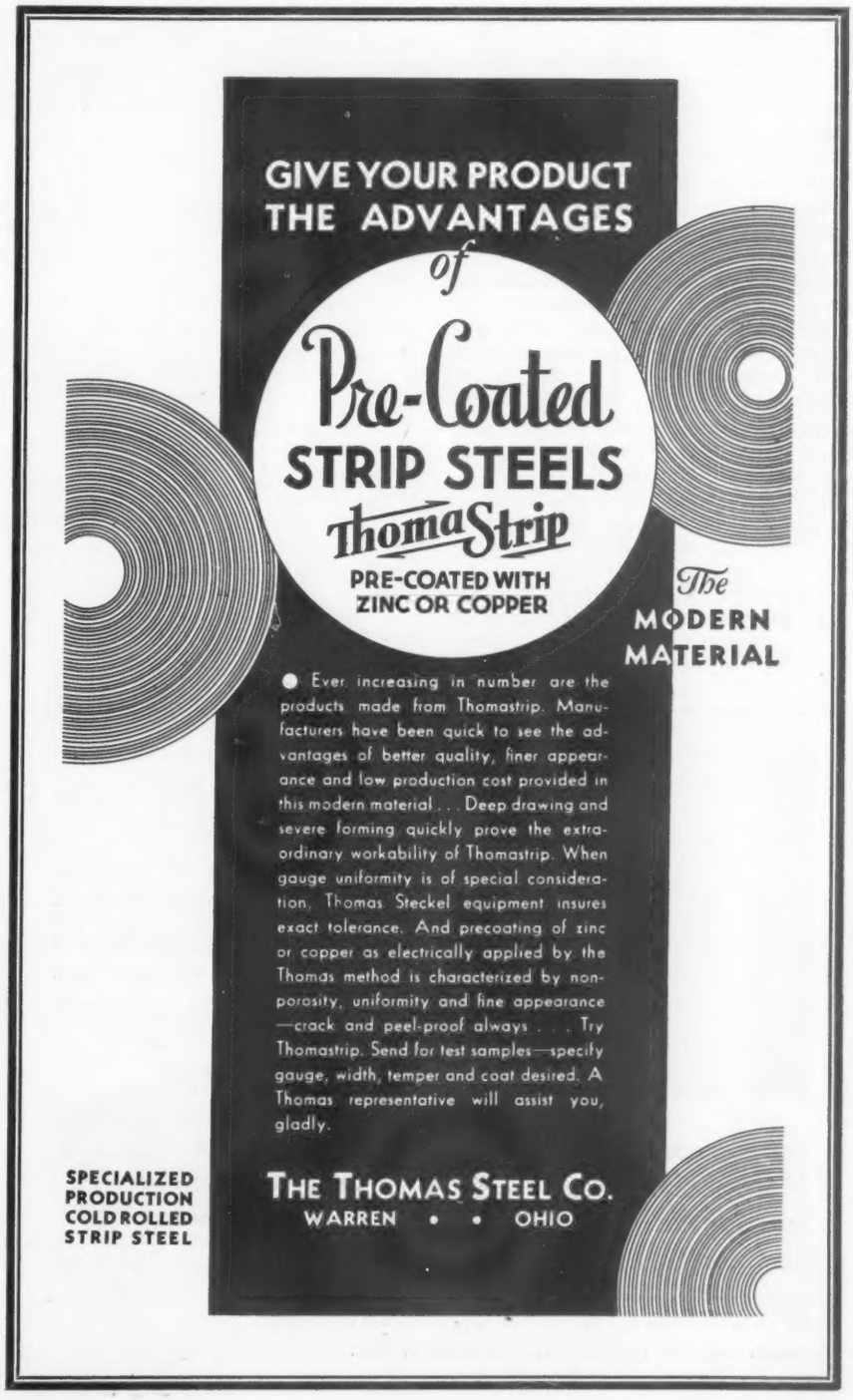
Chicago—Scrap is acquiring additional strength in spite of continued light mill buying. Sellers are anxious to cover orders and whereas some heavy melting steel recently was picked up at as low as $8, bids now generally are not lower than $8.50. Several railroad specialty grades are up 50 cents, including car wheels, couplers and knuckles, while railroad malleable scrap, borings and angle bars are 25 to 50 cents a ton higher.

Boston—Scrap buying is light with prices weak, several grades having declined. Some heavy melting steel is being bought for export, via New York by barge, dealers paying $6.50 dock for No. 1 and $5.50 for No. 2.

New York—Several steel mills are in the market for scrap, resuming buying after several weeks of inactivity. A Pencoyd, Pa., consumer is reported to be offering $8, delivered, for No. 2 steel. Prices are steadier, the decline on practically all grades having been halted.

Philadelphia — Buying of heavy melting steel, including 5000 tons to a Claymont, Del., consumer, has caused an advance of $1 per ton, to $10, delivered. Several other grades also are higher. No. 2 steel now is quoted at $8 to $8.50, delivered, and others on a higher level are heavy cast, compressed sheets, shafting, axle turnings and railroad wrought. Railroad malleable and couplers are slightly weaker. Machine turnings are reported sold for Coatesville, Pa., delivery at $6.50.

Buffalo — There is evidence that tonnage purchases of stove plate may be made soon and that some specialties may be taken in fair quantities. Heavy melting steel is not expected to move in tonnage un-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til January. Prices are nominally a little stronger, without confirming sales.

Detroit—Blast furnace scrap grades are off 50 cents, largely because demand has slumped since water shipments ceased. New heavy auto cast is up 50 cents, reflecting a little heavier demand as automobile foundries get into production on new models. Offerings of scrap should increase over the rest of the month. Generally, the market continues weak.

Cincinnati — Quotations on iron and steel scrap here remain unchanged, but the market has firmed up because of bullish sentiment among dealers. Such sentiment is likely based partly on influence from other districts; mills in this district have remained out of the market.

St. Louis — The market for iron and steel scrap has developed considerable activity, with prices, particularly on steel items, sharply higher, due to additional purchasing by American Steel Foundries, totaling about 10,000 tons during the past two weeks.

Birmingham, Ala. — While sentiment is better in the market for steel and iron scrap it has not been reflected in quotations.

Toronto, Ont.—Trading in iron and steel scrap continues specialized. Iron grades, with cast scrap favored, are the most active. Dealers have little call for steel grades. Export demand disappeared with the closing of St. Lawrence navigation. Yard holdings are heavy in most lines.

Strip Steel

Strip Prices, Page 47

Strip steel is moving more actively in all market areas, in part due to shipments against fourth-quarter contracts, in the haste to complete those deliveries. Some additional buying for current delivery is also being done, with request for immediate shipment. Most consumers are buying on a hand-to-mouth basis.

The market is 1.75c, Pittsburgh, on hot-rolled and 2.40c Pittsburgh, on cold-rolled, into first quarter. There is a feeling that an advance in the spot market may be made shortly after the turn of the year. This would in part recompense producers of strip steel for the $2 advance on hot-rolled and the $3 advance on cold-rolled which had been expected on contracts for first quarter.

Chicago producers find orders from automotive consumers slightly heavier, though better volume seems imminent. At Cleveland the market has a better tone, with more inquiries and spot sales and some contracting for first quarter. Automotive needs predominate. With some possibility of an advance in price during first quarter, consumers are anticipating requirements, with considerable use of the form of contract canceling unspecified tonnage.

Demand in New England is improving slowly as consumer stocks are lessened. Specifications are heavier in eastern Pennsylvania than was the case a month ago. Some large consumers are said to have sufficient stocks to last well into 1934 and buying for first quarter is expected to be modest.

IF you have a problem of removing iron, in any form, where detrimental to your product or for profitable iron recovery, consult the Stearns Testing Laboratory. Regardless of your past experience, it pays to submit your problems to specialists, because of new developments and research in magnetic separation. Write for bulletin "The House of Magnetic Magic" describing the service in detail, or send samples of your product for test.

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Metals

Nonferrous Metal Prices, Page 48, 49

New York—A fairly steady price situation was apparent in the nonferrous metals last week with the exception of lead and tin. Lead moved in substantial volume but demand for other metals was quiet.

Copper—Sentiment was bolstered by reported progress on a code acceptable to both mine producers and custom smelters. No shading of the 8.00c, Connecticut, price on electrolytic was in evidence.

Zinc—Prices held firm despite quietness and the revelation that stocks had jumped nearly 6000 tons in November due to a slump in shipments.

Lead—Quotations were marked up $2 a ton Monday to the bases of 4.05c, East St. Louis, and 4.15c, New York. Demand was heavy and widely diversified. This gave the market a strong appearance.

Tin—Average price level for the week was slightly lower due to strengthening of the dollar in terms of sterling. Buying was fair.

Antimony—Demand was dull but prices held.

Aluminum—Remelt grades were slightly stronger; scrap higher.

Nickel—Canadian production of 52,778,220 pounds for the first nine months was more than double the 25,598,620 pounds for the like 1932 period.

Coke By-Products

Coke By-Product Prices, Page 47

New York—Inquiry for toluol and benzol is slightly heavier. Xylol and solvent naphtha are in steady and unchanged demand. Distributors have generally covered contract consumers for first half of 1934. Naphthalene is moving slightly better. Prices are unchanged.

Quicksilver

New York—Fair orders have been booked for quicksilver, and the undertone of the market is better. Small lots generaly are $67 to $68, a virgin flask of 76 pounds, while some sellers are naming as high as $69. Round lots are $66 to $67, although $68 is quoted in some instances.

Pacific Coast

Pacific Coast Prices, Page 47, 48, 50

San Francisco—(*By Air Mail*)—Less than 600 tons of steel products were reported placed during the past week, but over 35,000 tons are up for figures or pending, about 17,000 being structural shapes.

Most reinforcing bar awards were in lots less than 100 tons. Unnamed interests secured 103 tons for highway work in six counties in California.

Concrete Engineering Co. took 105 tons for highway work in Arizona, and Soule Steel Co. booked 200 tons for a crossing in San Bernardino county, California. The latter also was low on 1000 tons for the Boulder dam. The metropolitan water district, Los Angeles, has taken bids on 500 tons.

The only plate award of importance went to the Southern Pipe & Casing Co., 289 tons of 22-inch pipe for the metropolitan water district, Los Angeles. Los Angeles opened bids Dec. 4 for 1365 tons of liner plates and 610 tons of structurals.

Bids will be called soon for 1450 tons of shapes and 550 tons of reinforcing bars for the Park avenue bridge, Oakland, Calif. New inquiries include 380 tons for a bridge over the Russian river in California, bids on which will be opened Dec. 8.

Demand for cast iron pipe is not active, less than 600 tons being up for figures. Redwood, Calif., opened bids Dec. 4 for 129 tons.

Northwest Prospects Good

Seattle—Iron and steel interests in the Pacific Northwest anticipate material improvement in 1934, based on stabilization of prices and the great amount of public work projected.

The week's awards included 364 tons of structurals and 25 tons of reinforcing for a state crossing at Spokane, Wash., to an unnamed eastern interest. For the South Umpqua river bridge, Oregon, 375 tons of shapes have been awarded to an unnamed fabricator, reported to be a Portland firm. Materials for two state bridges in Montana, a 300-foot structure at Miles City, and 287-foot bridge in Granite county, tonnage unstated, have been awarded to unnamed fabricators.

Wallace Bridge & Structural Steel Co., Seattle, is low at $66,728 for construction of three 71-foot steel cutters for the public health service. Berg Shipbuilding Co., Seattle, is low with the Moore Shipbuilding & Dry Dock Co., Oakland, Calif., for building the steel lighthouse tender HOLLYHOCK, at $373,000, delivery at Seattle in 300 days.

Todd Dry Docks, Seattle, bid $335,000 for reconditioning the former navy ship RAPPAHANNOCK, Craig Shipbuilding Co., Long Beach, Calif., being low at $199,177. The Todd plant, Seattle, has a $90,000 repair job on the steamer H. F. MCCORMICK, involving a number of new plates.

It is reported that the Pacific Coast Steel Corp. is low on about 6000 tons of steel sheet piling, shapes and reinforcing for the navy pier at Pearl Harbor, T. H.

Yakima, Wash., has purchased on low bid 11,000 feet of 4 to 12-inch cast iron water pipe from Pacific States Cast Iron Pipe Co., Provo, Utah.

While exchange favors the export of steel scrap to the Orient rising ocean freights are worrying exporters. Scrap prices have recently advanced, No. 1 foundry steel being about $7 gross while rails are up to $9 and $9.50.

Steel in Europe

Foreign Steel Prices, Page 50

London—(*By Radio*)—Inquiries for steel and iron products are increasing in the Middlesbrough district and order books are filling, while hematite pig iron stocks are falling rapidly. German competition in foreign markets is keener. Billet makers are now sold to the end of January; structural and rail mills are busy.

The Midland district also is strengthening its position. Structural work still is light.

Scottish business is steadier and shipbuilding is showing improvement. Domestic sheet trade is fair but exports are hampered by exchange fluctuations.

The Continent reports improvement and business in merchant bars is brisk. Russia has placed sheet orders in Belgium and structural steel orders in France. Germany reports better business from the Far East and Africa and finds the outlook generally improved.

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Warehouse

Warehouse Prices, Page 50

Although base prices on warehouse steel products were unchanged last week, a change in method of basing warehouse prices is about to be adopted with the signing of the steel warehouse code. The code may be signed this week. Under this plan warehouse prices will directly follow mill bases. To deliver warehouse steel at a point outside of Pittsburgh, a warehousing extra of around $1 to $1.25 and the all-rail rate to the delivered point will be added to the Pittsburgh base. Thus warehouse prices will fluctuate directly with mill base prices. Orders for warehouse steel at Pittsburgh are less than a month ago but still above December, 1932.

Sales at Chicago show resistance to seasonal influences. Improved volume with some warehouses at New York is due to settlement of strikes at small shipyards. Except for this enlarged outlet volume is unchanged, as are prices.

Contrary to seasonal trend, warehouse business in iron and steel at Detroit remains comparatively high, practically at the October-November level. But as production starts and mills begin shipment in volume, reliance upon warehouses will decrease. Prices generally are unchanged.

An advance of $3 a ton on cold-finished steel bars at Cleveland is in prospect for Jan. 1, corresponding to a similar increase in mill price effective that day. Bar orders improved slightly during the week. The approach of inventory time, however, is slowing up business, and from present indications December volume will be below November, which was below October.

November warehouse sales at St. Louis were below those of October, though better than for October, 1932. Public works takes most material.

Bolts and Nuts

Bolt, Nut, Rivet Prices, Page 47

Oliver Iron & Steel Corp., Pittsburgh, has received from New York port authority a contract for approximately 1800 tons of bolts and nuts for the Midtown Hudson tunnel, New York.

Producers expect to announce prices for first quarter soon. Meantime, bolts and nuts are 70 off, with small rivets 70 and 10 off and large rivets 2.75c base, Pittsburgh, 2.85c, Chicago.

Producers have extended the 6.00 to 6.25 off discount on wrought washers, at least through December.

Demand still is far from satisfactory and specifications are light.

Cleveland nut and bolt manufacturers expect shipments in the first three weeks of December fully equal to the comparable period in November, the volume of last month was about 20 per cent larger than in October. Automotive requirements are expanding

Two tankers being figured by the New York Shipbuilding Co., Camden, N. J., are expected to take 300 tons of steel rivets and 120 tons of iron rivets.

Bayonne Bolt Corp., New York, has been awarded an order totaling $6000 for stainless steel bolts for the New York state barge canal locks. J. C. MacElroy Co., New York, has booked 40 tons of dock bolts for the city of New York.

Ferroalloys

Ferroalloy Prices, Page 48

Ferroalloy producers have not yet determined first quarter prices. In the meantime, ferromanganese is $82, seaboard; or $87.24, delivered Pittsburgh. An announcement is expected before Dec. 20. Ferromanganese contracts hereafter will be made quarterly, instead of semiannually.

Equipment

Buttressed by purchasing in fair volume for navy department needs, sales of machinery and equipment in the main are trending higher.

Eastern Rolling Mill Co., Baltimore, has placed an order with Mesta Machine Co., Pittsburgh, for a 4-high skin-pass cold mill which will be used to finish both cold-rolled sheets and stainless sheets. Other buying of mill equipment at Pittsburgh still is slow.

Monarch Machine Tool Co., Sidney, O., has been awarded nine engine lathes by the navy department, mostly for Brooklyn, N. Y., and the other eastern yards. American Tool Works Co., Cincinnati, has booked five similar lathes, also for the navy.

Some dealers in New York report a larger proportion of heavier metalworking machinery in current sales, with a fair volume of inquiries being figured.

Chicago reports indicate miscellaneous equipment users still are conservative in making plant improvements, and used machinery is in frequent demand. Fair activity prevails there in foundry equipment sales.

Several ball bearing manufacturers in the New England district have bought grinding equipment, while others have issued inquiries. In general, demand for metalworking equipment in this district is unchanged.

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TOOL STEEL TUBING

Manufacturers of BISCO Tungsten Carbide and Tantalum Carbide drawing dies for wire, rod and tubing.

A saving will be realized by using our Tool Steel Tubing. Carried in stock up to 12" O.D. x 2" wall thickness. It is excellent for all classes of dies, slitters, spacers, bushings, etc.

We also supply a special tubing conforming in analysis to S.A.E. 52100 and S.A.E. 4615 designed particularly for Ball Bearing purposes. Can be furnished in Hot Rolled or Cold Drawn finish.

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Construction and Enterprise

New York

LOCKPORT, N. Y.—Nussbaumer & Clark, Inc., engineers, Buffalo, have been engaged to prepare plans and specifications for a garbage incinerator for Lockport, N. Y.

NEW YORK—Becker-Lynch Inc. has been incorporated with $10,000 capital to manufacture ornamental metal work, by Herman Schiller, 132 Nassau street, New York.

ROCHESTER, N. Y.—City has been allocated $660,000 for construction of a sewage disposal plant and work will be started in a short time.

ROCHESTER, N. Y.—Kellogg Mfg. Co., manufacturer of air compressors and other machinery, will open a Canadian branch at Niagara Falls, Ont., shortly.

New Jersey

NEWARK, N. J.—Union Structural Iron Works Inc. has been incorporated with 2500 shares no par value to fabricate metal products, by Harry R. Rinsky, agent, 1060 Broad street, Newark, N. J.

Pennsylvania

LANSDALE, PA.—Lansdale Foundry Co. Inc., plant has been bought by Duplex Foundry Corp., Philadelphia, which will place it in operation at once.

NEW KENSINGTON, PA.—Two frame warehouses belonging to the A. Deitch Co., scrap dealer, were burned recently with loss of $12,000.

PITTSBURGH — Southern Ohio Electric Co., Athens, O., plans construction of an overhead high voltage transmission line across the Ohio river at Eureka, O.

PITTSBURGH—Ohio River Dredging Co. has applied to United States engineers here for permission to build a coal tipple on the Ohio river at Huntington, W. Va., including a coal bin and conveying machinery for loading barges.

Ohio

CLEVELAND—Ball Bearing Faucet Washer Co. has been incorporated with 250 shares no par value, to manufacture metal products, by Charles A. Rogers, Union Trust building, Cleveland.

CLEVELAND—Rex Brass Co. has been incorporated with 250 shares no par value to manufacture metal products, by Paul Blasie, East Ohio Gas building, Cleveland.

FOSTORIA, O.—Great Northern Distilleries Inc., recently incorporated to build and operate a distillery, has obtained a site on the Nickel Plate tracks and plans are being prepared for a plant to cost about $400,000. Pipe line conveyors will be provided to convey grain from nearby elevators. Don C. Hanover, Fostoria, O., is president and Claude H. Stone, Detroit, is vice president and general manager.

Michigan

BENTON HARBOR, MICH.—Benton Harbor Brewing Co. is having plans made by M. F. Strauch, engineer, Chicago, for an addition and alterations to a warehouse building in Benton Harbor for use as a brewery. Joel G. Pearson, Benton Harbor, is in charge. Project is estimated to cost $90,000.

DETROIT—Velvet Power Brake Co., 4835 Cabot avenue, has been incorporated with $181,300 capital to manufacture automotive devices.

DETROIT—Warren Iron & Metal Co., 3315 Barlum tower, has been incorporated with $5000 capital to deal in iron, steel and machinery as brokers.

DETROIT—A. & B. Tool & Mfg. Inc. has been incorporated with $4000 capital to manufacture tools, dies, jigs, by J. L. Holdsworth, 255 East Buena Vista avenue, Highland Park, Mich.

LANSING, MICH.—W. S. Holmes, architect, Lansing, is preparing plans for a $30,000 high school addition and a $75,000 grade school building.

Indiana

HAGERSTOWN, IND.—Perfect Circle Co., manufacturer of piston rings, will build a manufacturing building with 50,000 square feet of floor space, in two units in the rear of the present plant. It will be of one story, sawtooth roof and is planned for further additions as needed. Cost will be about $75,000.

INDIANAPOLIS—Elmco Equipment Co. Inc. has been incorporated with 1000 shares capital stock to manufacture electrical and technical equipment, by J. C. Schaf Jr., Wilfred K. Krauss and Walter H. Green.

Illinois

EAST ST. LOUIS, ILL.—Central Breweries Inc. has spent $150,000 for plant and equipment and will install additional bottling machinery at cost of $25,000. Wagner Brewing Co., Granite City, Ill., will add to its bottling facilities. Louis Obert Brewing Co., 2700 South Twelfth street, St. Louis, is taking bids for a new bottling plant to cost $55,000.

CHICAGO—Illinois Sound Equipment Co., 143 West Austin avenue, has been incorporated with 3000 shares capital stock to manufacture equipment for the reception and recording of sound, by W. D. Woolesen, correspondent, 77 West Washington street, Chicago.

CHICAGO—Johnson Fan & Blower

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AIR COMPRESSORS—Sizes from 250 to 4000 cu. ft. Ingersoll-Rand Type PRE-2, 20¼" & 32" x 24", dir. conn. 600 HP, 2200/3/60 Synchronous Motor.
BENDING ROLL—10' Pyramid, ¼" capacity Slip Ring MD with Reversing Control. Drop End Housing. 16'6" BESCO 1¼" capacity Pyramid Type, MD.
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Shepard 5-T., 52' 4" span, 3-motor, 230 v. DC, enclosed for outdoor service and complete with 350 feet of Double "A" Frame Runway.
Northern 5-T., 50' span, 3-motor, 220 v. AC, floor control, outdoor service, complete with 100 feet of Double "A" Frame Runway.
FURNACE—Moore Rapid Lectromelt, 500 lb. per hour rated capacity, 3 phase, 60 cycle, complete elec. equip. including 2200 v. AC Transformer, etc.
FURNACES—Heat Treating, Nitriding, etc.
FORGING MACHINES OR UPSETTERS—2" Acme, late type, steel frame, silent chain motor drive with 15 HP 220-440/3/60 AC motor and starter. Dies, etc. There are various other sizes available from 1" to 7"—National; Ajax and Acme manufacture.
Taper Forging Rolls, Hot Saws and Burring Machines.
GRINDER—Keller Universal Cutter and Radius, Type R-6, with all attachments, motor drive.
HAMMER—Nazel, Size 3B with direct connected AC motor, starter, etc.
Also Board Drop; Steam Drop; Steam Forging, sizes up to 12,000 lbs.
MOTORS—Mill Drive, AC and DC, 500 to 1500 HP with or without reduction gear set.
PRESSES—Toggle Drawing, Single Crank.
13A and 15A Bliss; 177 Toledo and 187 Toledo Toggle Drawing, Double Crank.
795½ Toledo; 408 and 412 Bliss.
Some of the above equipped with Marquette Cushions.
PRESSES—Single Action, Double Crank.
Bliss No. 6½ & No. 7 Single Geared, Belted MD.
Bliss No. 7B; No. 9E & No. 12 Double Geared, MD.
PRESSES—TRIMMING. Hot and Cold.
TESTING MACHINES—Olsen & Riehle, 50,000 lb., MD.
Riehle Hydraulic, 600,000 lb. capacity.

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In addition to the above, we have available a wide variety of good equipment in various types and sizes.

Manufacturing RITTERBUSH & COMPANY, INC. Equipment
30 CHURCH ST.
NEW YORK CITY

Corp., 1319 West Lake street, has been incorporated with 2000 shares no par value to manufacture fans, blowers, heating equipment air-conditioning equipment and ventilating machines, by Scott, MacLeish & Falk, correspondents, 134 North LaSalle street, Chicago.

Southern States

WASHINGTON—Bureau of supplies and accounts, navy department, will receive bids until Dec. 15, as follows: Specification 1320, one electric furnace, for Mare Island, Calif.; specification 1332, one motor-driven horizontal, boring, milling and drilling machine, for Brooklyn, N. Y.; specification 1334, one motor-driven extra heavy plate scarfing and plate edging planer, for Philadelphia; specification 1335, one heavy-duty vertical boring and turning mill, for Philadelphia; specification 1361, one motor-driven air compressor, for Norfolk, Va.; to Dec. 19, one motor-driven open-side metal-cutting planer, for Puget Sound, Wash.

CHATTANOOGA, TENN.—Columbian Iron Works, Morrow Chamberlain president, manufacturer of valves and fire hydrants, has been bought by the Mueller interests, Decatur, Ill., and alterations and improvements will be undertaken at once.

Missouri

ST. LOUIS—Domestic Gas Machine Corp., A. N. Kingsbury, president, has been organized to produce machines for manufacture of gas from pentane, a natural gasoline product, for use where piped gas is not available.

Wisconsin

BEAVER DAM, WIS.—Application has been made for a federal loan and grant of $100,000 for building a sewage disposal plant and system. Plans are by Jerry Donohue Engineering Co., Sheboygan, Wis. W. A. Gergen is city clerk.

EAU CLAIRE, WIS.—A. J. Johnson Machine Works, 619 Menomonie street, is building a shop extension.

FOND DU LAC, WIS.—City council has authorized a bond issue of $60,000 for a sewage disposal plant and $28,000 for restoration of the underground water system, requiring 10,000 feet of cast iron pipe. G. H. Stanchfield is city engineer.

MADISON, WIS.—Regents of the University of Wisconsin have tentatively approved a $1,160,000 building program, including a $330,000 electrical engineering laboratory. M. E. McCaffrey is secretary.

MADISON, WIS.—State board of control is seeking federal loan of $248,000 for a heat and power plant at northern Wisconsin colony and training school, Chippewa Falls, Wis., and a similar plant costing $197,000 at the state veterans' home and hospital at Waupaca, Wis. John J. Hannan is president of the board, Madison, Wis.

MANITOWOC, WIS. — Aluminum Specialty Co., Seventeenth and Woolwer streets, will build a 1-story plant, 40 x 60 feet. General contract has been awarded to Rasper Construction Co., 4 North Eighth street, Manitowoc, Wis.

MARINETTE, WIS.—A proposed bond issue of $40,000 for initial construction of a vocational school has been rejected at a special election.

MILWAUKEE—Monarch Tool & Die Works, 815 West Juneau avenue, has been incorporated under title of Monarch Tool & Die Co., with a capital stock of 500 no-par shares. O. C. Gebhardt remains the principal owner.

WONEWOC, WIS.—C. E. Hamburg and associates have incorporated as the Hamburg Brewing Co. with capital of $200,000 and will build a complete new brewing and malting plant costing $135,000. Architect U. F. Peacock, 719 North Thirty-second street, Milwaukee, is completing plans.

Kansas

KANSAS CITY, KANS.—Board of public utilities, C. A. Lowder secretary, plans three booster pumping plants and equipment for the municipal waterwork system, to cost about $112,000.

Colorado

DENVER—United States Vanadium Corp. has completed its survey in Montrose county, Colorado, and will build a mill on the site of the Standard Chemical Co. mill. Blair Burwell, Rifle, Colo., is superintendent.

Pacific Coast

BRAWLEY, CALIF.—Koebig & Koebig, 821 Rowan building, have completed plans for a water filtration plant, bonds for $65,000 having been authorized for the filtration plant and $158,000 for water mains.

FRESNO, CALIF.—Golden State-Athens Baking Co. has let contract to Roy Martin, Olive street, for construction of a 1-story brick bakery, to cost $50,000, including equipment.

FRESNO, CALIF.—Emilio Giometti, 1480 Blackstone avenue, has let contracts for structural steel and general construction of a brewery plant. Equipment will cost about $60,000. W. D. Coates, Rowell building, is architect.

GLENDALE, CALIF.—Los Angeles county supervisors will build a blacksmith shop in Baldwin park, including steel frame, corrugated sheet roof, steel rolling doors and steel windows. J. B. McIntosh, 1842 Gardenia avenue, is low bidder.

HUNTINGTON BEACH, CALIF.—Construction has been started on a refinery for the O. C. Fueld Gasoline Co., to cost $100,000. Capacity will be 25,000,000 feet of gas daily, with peak load of 40,000,000 cubic feet. Gasoline will be produced from natural gas.

RIVERSIDE, CALIF.—T. G. Prichard, 5260 Magnolia avenue, has been given a contract by the board of education for erection of a steel frame shop building for the polytechnic high school, to cost $21,000. G. Stanley Wilson, 3616 Main street, is architect.

SAN FRANCISCO—K. E. Parker, 135 South Park, has been awarded a contract for construction of machine and electric shop at Bremerton navy yard by the bureau of yards and docks, navy department, Washington, at $655,400.

SAN FRANCISCO—J. A. Roebling's Sons Co., 646 Folsom street, has bought a site in Marin county, near California City, and will build a plant for the manufacture of cables for the Golden Gate bridge. The company has a contract for $5,855,000 worth of cable. The plant will cost about $500,000.

ONTARIO, OREG. — Further development units in the Owyhee irrigation project include two siphons on the Owyhee and Snively rivers, requiring 1600 feet of 9-foot steel pipe and a siphon 4.5 miles long on the Malheur river. Steel requirements total about 8000 tons.

EVERETT, WASH.—Riverside Junk Co. has been incorporated with $25,000 capital by Abe Michselson, through Newton & Newton, attorneys, Central building, Seattle.

PORT ANGELES, WASH. — Coast guard will ask bids within 30 days for the proposed air base at Ediz Hook. Andre Fouchy, Pacific coast engineer for the department, has completed a site survey. Cost is estimated at $290,000. Project includes a hangar 100 x 120 feet, machine shop and other structures.

SEATTLE—United States engineers have asked bids for Dec. 20 for six gate-operating machines for the Lake Washington canal.

SEATTLE—Carl Siebrand, architect, 5016 Twenty-first avenue N. E., is making plans for remodeling a building on Westlake avenue for the Northwest Distilleries Co. at cost of $150,000. A 6-story tower is included.

VANCOUVER, WASH.—Bids have been rejected on a school structure 140 x 150 feet and new tenders will be asked shortly. W. F. Higgins, Terminal Sales building, Portland, Oreg., is architect.

Dominion of Canada

KINGSTON, ONT.—A. Davis & Son, 407 Rideau street, Kingston, Ont., plans construction of a 3-story tannery, 50 x 200 feet, to cost $60,000. Margeson & Babcock, 210 Dundas street, Toronto, Ont., are engineers.

WOODSTOCK, ONT. — Rostrom Chemical Co., Thomas Rostrom, manager, Oshawa, Ont., plans to establish a branch plant to cost about $40,000.